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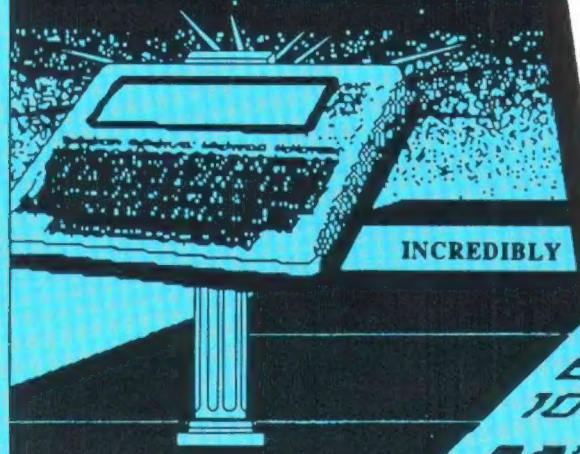

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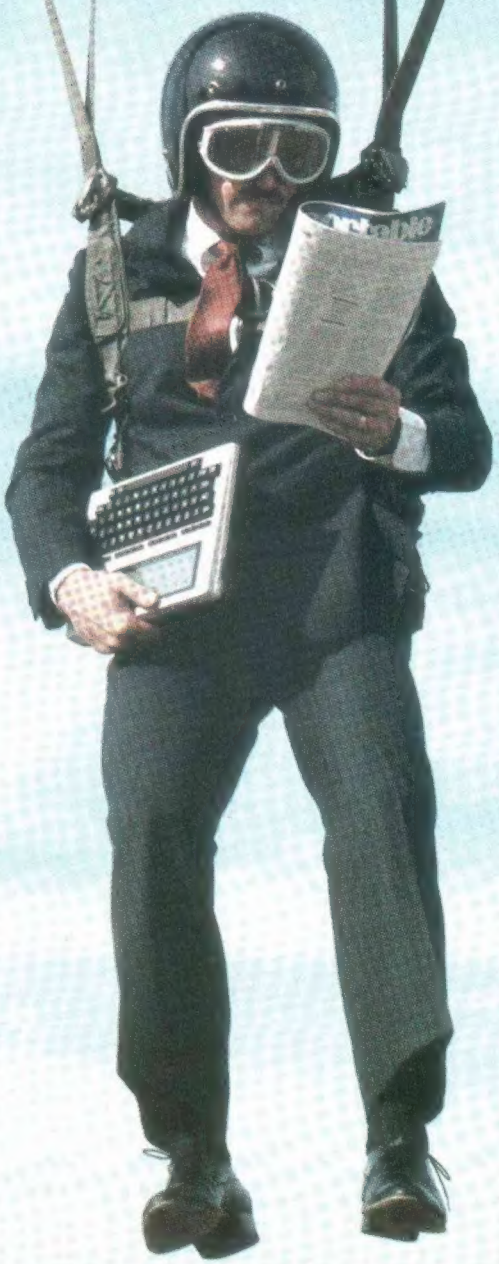

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TERRY KEPNER'S

portable 100

VOL. 5, NO. 2 FEBRUARY 1988

ON THE COVER: **Haitian Clinic**
photograph by Clyde McNair (front lines photographer)

FEATURES

UTILITY CORNER

DEPARTMENTS

ROM WITH A VIEW

Welcome to our second issue. The first issue has been on the stands for only a few days and already we're starting to receive calls from readers supporting us. It's nice to know that our readers care enough to respond that fast.

Several readers have called to point out an error or two that they found in that issue (one went so far as to point out every proof-reading error that could be found). We appreciate this attention and will strive to make each issue as perfect as possible. Unfortunately, we're only human and as such occasionally make mistakes.

The first several issues will probably have more than their share of errors simply because we're working with a brand-new (to us) magazine and haven't worked out a smooth processing system yet. Adding to that is the fact that we simultaneously doubled our in-house staff and they are still in the learning phase of their jobs.

Once we've had a chance to learn the proper system for processing Portable 100, you'll see a marked improvement between the 1987 issues and the 1988 issues.

We're also starting to receive some of the articles we've commissioned, you'll see the first of them next month. We have several projects we want to pursue, the first of which we literally just put on-line today: our Bulletin Board System.

The Portable Computing International Corporation Bulletin Board System (PBBS for short) is now ready and willing to serve you 24-hours a day, every day. The phone number is 603-924-9770. We accept either 300 or 1200 baud calls, with protocols set to eight-bit words, one stop bit, and no parity, (M8N1E or 58N1E).

The PBBS is for ALL portables, not just Tandy, so don't be surprised by what you find when you sign on, we already have a couple of hundred files ready for downloading. The Tandy list only has 63 files at the moment (we had an accident that lost us about 30 files), but that won't remain down there for long.

If you have any files you think should be on our PBBS, by all means load them up and let us make them available to everyone else. The only restriction is that we cannot allow commercial, copyrighted software to be posted.

Give it a try.

Terry

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When we designed *Disk*+ we did it out of necessity. We wanted a way that we could just connect a Model 100 to our desktop computer with a cable and save files onto the desktop's disk drive. We wanted it to be so simple to use it would be self-explanatory.

Picture this. *Disk*+ comes to you on a Snap-in ROM and a diskette for your desktop. You take a quarter and open the little compartment on the back of your Model 100. Then you just press the ROM into the socket. *Disk*+ appears on your main menu just like a built-in.

You connect your Model 100 to your other computer using an RS232 cable (available from PCSG for $40).

You just place the *Disk*+ diskette into the desktop's drive and turn on the computer. It powers up automatically and says "awaiting command" on your desktop's screen. Then you just put the widebar cursor on the Model 100 main menu on *Disk*+ and press ENTER. You are shown your RAM files arranged just like the main menu.

To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk*+, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk*+ is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

Disk+ takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk*+ users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

This means you can write something on your Model 100, and with *Disk*+ transfer it instantly to your desktop and start using it right away on your bigger computer. Or the way we like to work is to type in a document on the desktop computer and then transfer it to our Model 100 with *Disk*+. Then we print out the document, beautifully formatted, using WRITE ROM.

Disk+ works with just about every micro sold, from IBM PC and its clones, to all Radio Shack computers (yes, all), to Apple II, Kaypro, Epson and most CPM. Just ask us. More than likely, your computer is supported.

Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk*+ they have an inexpensive disk drive.

And if that weren't enough, how about this: *Disk*+ also provides cross-compatibility between different computers like IBM, Apple or the Model 4 using the Model 100 as the intermediary device. Quite a feature!

The snap-in ROM is really great because you can use other ROMs like *Lucid* or WRITE ROM. They snap in and out as easily as an Atari game cartridge and you never lose your files in RAM.

Anyone who ever uses *Disk*+ simply can't do without it. But so many times we have had new users call us and say, "Wow! I had no idea when I ordered it that *Disk*+ would be so fantastic. I just couldn't believe that I could use my desktop computer's disk drive with my Model 100 just like it is another main menu."

That's why we sell *Disk*+ on a thirty-day trial. If you aren't completely satisfied, return it within thirty days for a full refund. Priced at $149.95 on Snap-in ROM. MasterCard, Visa or COD.

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RE: YOU BE THE EDITOR

I hate to judge or rate the articles per se. I feel like I'm condemning the writers when actually it's the subject I'm knocking.

I must say, I have not liked the last two issues at all. I really found nothing (article wise) of interest. I do not want any programing, I'm strictly a user. I am not a tinkerer. I'm all thumbs. I'm not good at anything complicated.

I've had my Model 100 since they first come out. I still don't know how to use anything but the built-in word processor, which I use frequently. I keep hoping for down to earth lessons on using what is built in; on how to dump from Model 100 to Tandy 1000 SX; rudimentary things like that. I don't know a lot of the graphics, the key pad, telecommunications, and so forth.

I enjoy in depth product review and the ads (to learn what is new). I want to know about user programs for the 100. I want them reviewed, compared, explained, etc.

Most of your writers write above my head. Good example: "The Scripy Text Processor for the 100." Despite the fact that I am a user, I might have been interested in this article if I could understand it, but it was like a foreign language. Couldn't it have said, "type in this program (illustrated) and it will do such and such for you. Do this, don't do that." Tell me how to use the computer in plain and simple everyday English, not technical terms.

I am not a dummy, but I do not understand technical things. I'm an author, I'm president of my county genealogical society (former realtor, former business woman, etc., etc., etc.), but I don't cut technical terminology although I love computers.

How about this? Are there any indexing programs for the 100? Is there any way I can gather data for an index on my 100 and dump it to the 1000 SX for processing by a commercial index program? (Indexing program with variable format, both simple and complicated).

Many of the more simple things you've run in the past (such as the article on genealogy) have been over simplified. That is, it was toying with the subject. It was a shallow program not worth typing in. Many of the basic programs are thus, just toys.

How does one get "Public Domain" on the 100?

How does one get "Public Domain" on the 100?

The reason I've never learned to use anymore than text on my 100 is that the manual is lousy. I'm sure I'm not the only one who found it so. Teach us to use the blasted machine, in plain language, in step by step lessons if necessary. There is nothing wrong with being rudimentary. Have an elementary teacher write the article, not a computer whiz or any old author.

Another example of gobbledygook is, "A Font for All Seasons." This is another article I might be interested in if I could understand a word he was saying. (Would it be safe to assume that if you can't pronounce the name the article would be equally as unintelligible such as Halovacs and Quindry. Just kidding of course.)

All these years I would have loved to have used the different fonts on my DMP 2100 using my Model 100, but never could. I can't understand the manuals and never could afford a program or knew of one that would do what I want, etc.

But back to the article. Take the first paragraph—please do—I don't want it. I read it three times. I understand the first half of the first sentence. What does the second half of that sentence say? I know what RAM is in a computer but not in a printer. Do all printers have RAM? I know what "typeface" means. I know what "user-defined" means, but I don't know what "support" means. So I can't really truly know what that sentence is saying! What does the second sentence mean? And although I understand the words in sentence three, I don't understand the concept. Get what I'm trying to say?

Paragraph two is OK. Paragraph three isn't too bad. Paragraph four could have been omitted or should be written much simpler. Paragraph five? It definitely needs help. If one can't get through the first five paragraphs why read on? The author does get better in some places. But please HELP! Let's analyze further. Paragraph two under "Running Fontax" sent (once) 2. What is an ASCII value? (I barely know what ASCII really is). What is a "descender character"? What is "dot columns"? What does he mean by "character starts and ends"? In the next sentance what is "default characteristics?"

What is meant by the info in (paranthesises) ? What does the last half of the last sentence in this paragraph say? The following definitions aren't too bad (except the last half of the first one and the data under "Down"). This article might have been useful to me if I had an Epson printer.

How does one program function keys? That's another good topic to run.

The writer Callaghan is quite understandable and I just may try his program! (Hope it works with the DMP 2100!) Laster writes some things that I can understand, some that I can't. But I like his simplicity in parts.

I'm not going to waste anymore of your time. I'm sure I'm in the minority, but then, maybe there are a lot more out there like me who don't resubscribe because they don't understand.

I will be anxiously awaiting your next issue in hopes of an in-depth review of new Tandy 1400 LT. I'll bet it will kill a lot of the Model 100 support field and possibly out date our 100s.

Louise Legeza
Conneaut, OH

By no means are you wasting our time with your letter. We sift through our mail daily looking for helpful criticisms like yours. We especially appreciate your comments concerning the ease, or difficulty, you have understanding the article and its subject.

As you are perhaps aware, CW Communications/Peterborough picked up Portable 100 after it had ceased publication almost eight months before (with sporadic distribution before then). As a result, they picked up the manuscripts left over from the previous management (not the best way to get started). After publishing three issues (August, September, October 1987), they started receiving new manuscripts, as word they were in business spread. Then, starting with the January issue, we took over.

Now manuscripts are flowing in daily. Plus we have contacted several authors we have used with our other magazine (PICO) and assigned reviews. As a result you should see a rather rapid increase in quality of writing and readability in Portable 100's articles.

We will certainly take your complaints and suggestions on improving our articles to heart, and strive to make them as clear and concise as possible.

While many of our readers are technically inclined, and/or very interested in programs, you are definitely NOT in the minority in being a novice and wanting articles explaining how to use your computer more efficiently. There are thousands of people just like you, but who are afraid to write because they fear their questions are "dumb." questions.

Now for some of your questions. First, I'm not sure exactly what you mean by an indexing program. Linda Tiernan, one of our editors and the Assistant Director of the Peterborough Town Library, is a professional cataloger. She simply uses a word processor to create an index, using the FIND function to help insert items in alphabetical order. She says the hardest part of indexing is determining the "keywords" to use for the index. Once you have these, creating the index is just a matter of putting the entries under the appropriate keywords.

There are no "dumb" questions.

Getting the index out of your Model 100 into your desktop is just a matter of using TELCOM on the Model 100, a null modem connector (available from Tandy), an RS-232C cable, and some type of communications program on the desktop (such as Crosstalk, XMODEM, or PC-Talk).

Public Domain software is software that is not copyright protected. Getting it in your computer is simple, just use your computer's TELCOM and built-in modem to call a Bulletin Board Service and then use the DOWN command to save the programs and files you find in the Model 100's memory.

Sorry about all the problems you had with the "Font" article. We'll fix that in a future article for you.

Having seen the Tandy 1400 LT, it isn't by any means a Model 100 "killer." It is designed for the MS-DOS market and is pretty hefty at 14 pounds weight and a $1,599 price tag.

Eds.

GRAPHICS SCREEN DUMP

I've had my Model 100 for several years and use it for many applications. The primary use is for scheduling my horse shoeing business, for which it is well suited.

One thing I haven't been able to find is a graphics package or a screen dump utility that would work. In the old magazine, I wrote to all the advertised graphic's vendors but never received a response. So...the ball is in your court.

Jim Weaver
Wellsboro, Pa.

Ultrasoft Innovations, one of our advertisers, has a screen dump program for the Model 100.

Eds.

ANY BACK ISSUES?

Just a quick note to pass on my new address and to congratulate you on the comeback of Portable 100 with the August issue, hoping that all future issues will carry on the same standard.

I have used a Model 100 for three years and encountered the software penury and support. I must confess that when "Portable 100" did its disappearing act earlier this year (1987), I was forced, directly do to this, to rethink the viability of carrying on using the Model 100 altogether. It would be a somewhat difficult task without your help. Fortunately enough (due to lack of funds!), I stuck with my Model 100 faithfully. That was just as well, now that Portable 100 is back for good.

I like your magazine a lot. Portable 100 has been a unique source of information. I was a very late bloomer to

its existence (January 86). I would like to purchase some back issues and would be grateful if you could quote me the price of back issues and the price of back issues via surface mail to Europe. Also the price of surface mail to an address in the USA. It might be worthwhile, cost wise having them sent to a friend who lives in the US. Do you still have all of the 1985 issues?

PS: I have found that some of the programs you printed in the past, I haven't been very successful with, in spite of thorough list typing. So I send you a listing for one, that I have been using for all costing, it only works with "CAPS LOCK" down.

Jean-Luc Michaud
Chertsey, England

Thanks for your support. As for back issues, we sorry to report that we only have September, October, November, and December 1987 available. All the previous issues, except August 1987, were impounded and destroyed by the printer in Camden, Maine. Should we come upon a stock of these that somehow managed to survive, we will make them available to our readers.

In the meantime, our technical editor is looking at your printout trying to find the problem.

Eds.

SOME MORE SUGGESTIONS

I was overjoyed when I saw Portable 100 Magazine on the shelf of my local bookstore. It was great to see it on the shelf amongst the 500 different magazines of those self proclaimed #1 desktops that you can't take anywhere unless you own a wheel barrel. Well, you know I snatched one up and rushed home to see what was inside. I was up most of the night typing in the programs, reading and just having a ball. I love the article Model 100 vs Model 102. It was a very fair comparison. I do hope you don't change the name to Portable 102, it just doesn't have that ring to it, you know!

Well, I just got this month's issue, and I had another great time absorbing all the fantastic articles in it. This month though I decided to cut out the middle man in this ritual and subscribe to Portable 100. I figure I'll save $25.00 just in gas driving to the bookstore to see if the next issue is in. This way I'll only have to wait for the mail man. I hope I can handle the suspense.

Anyway in both issues you wanted some input from your readers. Well, here's some input. First, I know you and your staff have probably already thought of everything I am going to suggest, but I thought maybe you would like to know if you are right about what we readers want. So here comes from one fan the most wanted services you could provide.

1. Now this is real nit picking, but how about some slashes on the zeros in your program listings. This would help novices avoid errors, and help pro's keep their speed up when typing in the listing.

I was up most of the night typing in the programs

2. Another good idea is the sample display you had in the Crazy Box article. It wouldn't hurt to have one for every program in the magazine.

3. You could, of course, avoid all of that by instituting a tape/disc of the month program.

4. You could also list all BBS carrying Portable Disk Drive software for Model 100/102, 200, 600, or start your own.

5. Expansion of I/O will happen anyway, so it's redundant to mention that.

I know all of these services cost more than I could imagine, but I think you would agree, the more you support us the more we will support you. I know after looking through a Portable 100 magazine, a few of those desk bound people should go into their closet and get their Model 100 out of moth balls. They should rediscover just how powerful it is, and how much they took it for granted.

I'll close with a question. I typed in LOADIT.BA and tried to run it, but I just couldn't get the program to run right. I don't know what the problem is. I've checked my data lines and I can't find an error. I am using one of the new portable disc drive twos from Tandy. Is there a difference between one and two? I appreciate any help you could give me on this matter.

Well, keep up the good work, and I'll be looking for my first issue in the mail soon. Hope I can wait.

Terry Miller
Mattoon, Il

We'll see if we can get the program listings to come out with slashed zeros.

We try to get sample displays of the programs, but that isn't always possible.

We are considering instituting a monthly programs disk, but haven't finished the cost/benefit analysis yet.

We do have a BBS of our own, unfortunately it is suffering from a blown power supply. When we have it back on line we will give you full details of what it has and how to access it.

The Portable Disk Drive One and the Portable Disk Drive Two are very different animals inside. In most cases, you don't notice the difference. Unfortunately, LOADIT.BA is one of the programs that is affected by the difference.

And thanks for writing.

Eds.

PEEK 63066, POKE 63066

It's great to see Portable 100 back again. I subscribed just before the magazine's last publisher went the way of the woolly mammoths. Now that the publication is back, I'll release some pent up demand for information: In the March 1986 issue, A.L. Zeichick presented TELCOM.BA to toggle the LF on the Model 100. However, there seems to be an error

in the listing: the program PEEKs 63066, and POKEs 63033. Shouldn't these both be the same location? I tried POKEing only the location that returned a 1 or 0 on the PEEK, but to no avail.

Along the lines of the last question, is there a way to have TEXT's built in PRINT function send LFs as well? I've nearly worn out the DIP switch on my printer at work!

SCRIPY.CO looks like a wonderful program, but it doesn't help those of us with serial printers and no assembly language experience. Could T.L. Quindry or anyone on your editorial staff suggest the modifications needed to print to the COM port?

Will back issues of Portable 100 be available? The March 1986 issue had an enhancement for a previously published calendar program, but alas, I have no access to the earlier program.

Finally, I would like to make suggestions for two major reviews in upcoming issues. First (if not already available), I would like to read a comparison of the two major multiprogram ROMs: Ultimate ROM II and Super ROM. I have heard wonderful comments about the text processor in the former and the spreadsheet in the latter, but would like to know more before taking the plunge. Will either one be offering a DOS as well? Second, with the increasing (?) number of options for expanding memory, now seems a good time to compare bankswitched memory with virtual memory approaches such as Booster Pack and Megamemory. I plan to use the Model 100 for extensive note taking and may not need the virtual memory solution, but then again... What are the trade offs between these two types of memory units (e.g., cost, size, weight)?

I look forward to many more years of Portable 100s!

Roy W. Reese
Brooklyn, NY

You are correct, you should be PEEKing and POKEing location 63066.

Correcting TEXT to add the linefeed requires a short machine-language program that you must load into high RAM, just below MAXRAM. We'll be publishing an article on that shortly.

As for changing SCRIPY.CO for the RS-232 port, we'll see what we can work up in the near future.

As we mentioned earlier, backissues prior to September 1987 are not available. Sorry.

Both ROMs are so large that a single review would take most of the magazine. We'll tackle them one at a time in a future issue. The PCSG ROM offers the ability to automatically load the Tandy DOS from Disk by pressing the F7 key. Traveling Software includes a function to load their TS-DOS off your disk drive (if you have TS-DOS, that is).

We have plans for reviews of the various add-on memory devices. Please be patient.

Eds.

The PCSG ROM offers the ability to load the Tandy DOS from Disk

MODEL 100 LAZY WRITER

While on the subject of Model 100 communications, it seems appropriate to mention a perfect fit for uploading files and downloading files: The Model 4 or 4P, using the word processor, Lazy Writer, written in Multidos 3.4C or 3.5.

For those not familiar with this application, it is quite simple to use, comprehensive, and in Multidos makes use of the Model 4 utilities, despite the fact that Multidos Is a Model III-emulating Disk Operating System. Lazy Writer in this mode has the simplest two key communication protocol. (On the other hand, Lazy Writer on Trsdos 6. must use the comparatively complex comm program of Trsdos 6.-).

On Multidos or Lazy Dos (an abortive form of Multidos), communications between Model 4/4P and Model 100 require a null modem and about 20 seconds to set up. The ASCII text loads into memory, and can be accessed by Lazy Writer which formats it automatically. The only changes are to create paragraphs, which Lazy Writer indicates but does not format. This provides formatted text in an excellent word processor, evades the usual problems of terminal programs, and releases precious space in the Model 100 to create permanent disk files in Lazy Writer.

For those of you lucky enough to have a model 4/4P and a Model 100, the investment in Lazy Writer is a must.

Dr. Charles Harris
Island Heights, NJ

We were unaware that Lazy Writer and the Model 4P made such a great support team for the Model 100. Thanks for writing.

THANKS

Thank you for publishing Portable 100.

I am retired and have a Model 100 which I am attempting to learn to operate effectively and efficiently. Up until now I have purchased PCM or 80 Micro magazines in the hope that there would be good articles for the Model 100. And nowadays there aren't many!

I expect to subscribe to your magazine in the near future after I move to a new address.

Thanks again for producing the Portable 100 magazine which will (hopefully) help me learn more about operating my Model 100.

Jane Marvin
San Francisco, CA

We appreciate your support. If you have any suggestions please tell us. Eds.

❑

Laptops In The Field: A Health Survey In Rural Haiti

These programs provide an in-the-field solution to data gathering and verification.

by Kelly, Musgrave, and Allman

Social science researchers working in third world field settings face a variety of problems which make gathering data a difficult task. The working conditions, available labor and logistical considerations combine to make accurate, timely, inexpensive data collection nearly impossible. In an effort to provide improvements in expensive, labor intensive, and often inaccurate survey methods, we have been working on techniques which provide alternative strategies for these problems. One result is a series of programs which can be used in any setting where fields of data need to be entered and verified, even if your computer store is only 1 mile away instead of 1,000.

FIELD CONSIDERATIONS

We recently conducted a survey to determine early childhood mortality rates as part of the evaluation of a primary health care program in a rural area of Haiti with a population of 50,000. An important innovation of the study was the use of a lap-top computer at a field office site as an aid to data entry and supervision.

The considerations which lead us to the strategy that we finally chose include:

- Inhospitable field conditions—hot, humid and dusty, with long dis-

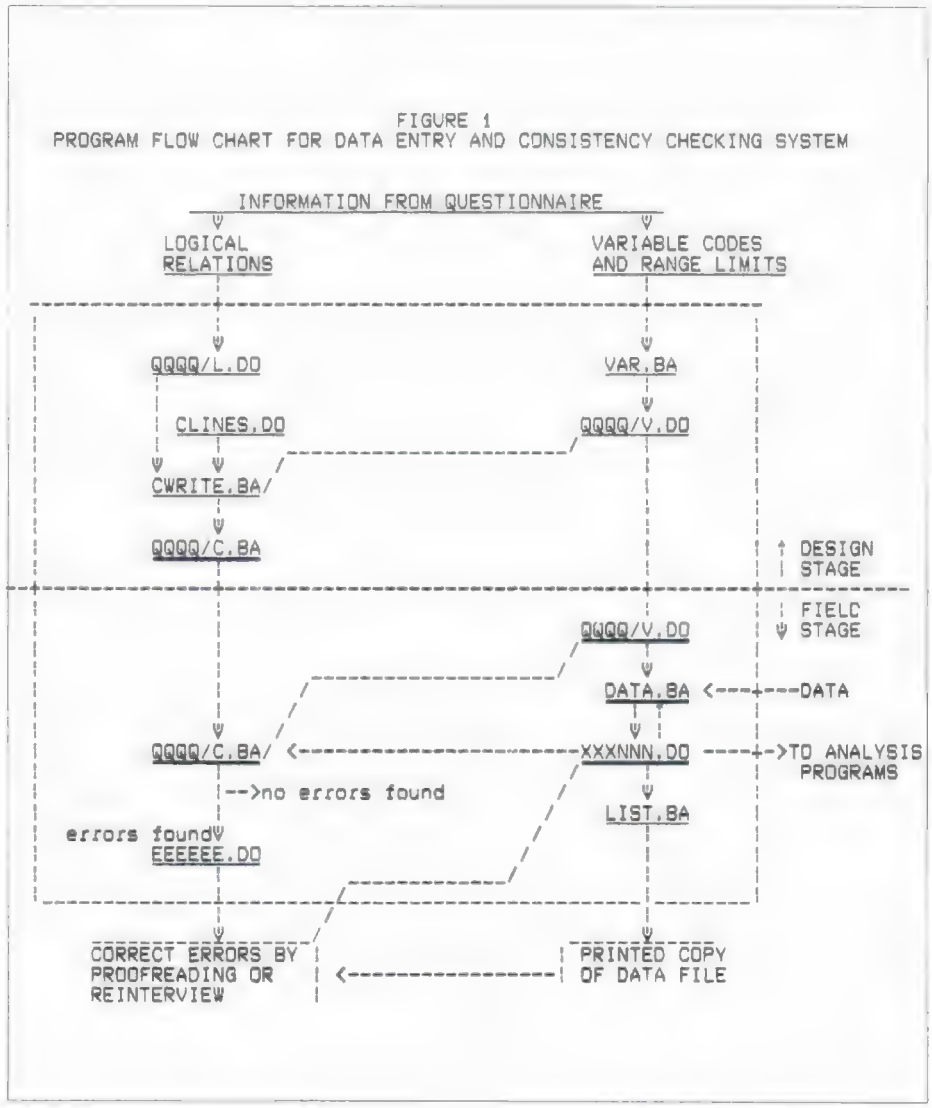

Figure 1. Program flow chart for data entry and consistency checking system

tances to be walked by interviewers and unreliable or non-existant power supplies;
- although well qualified staff are available for supervision, the need to have mature women interviewers of local origin to improve interview interaction, resulted in potential interviewers of limited educational background;
- the need to generate results as quickly as possible;
- a tight total program budget, with any funds used for the survey research therefore not being available for service operations;
- a desire to improve data quality, as several recent surveys on mortality have had many cases with inconsistent responses and overall patterns of responses which indicated that some births and deaths were not being reported.

These programs have great flexibility

The system which we chose is a combination of the Tandy (Radio Shack) Model 100 or 102 with some accessories (32K RAM is convenient, but not essential), a series of programs for data entry and checking, and the preceding births technique of mortality estimation. Certainly more "powerful" systems are available for use on PC compatibles, but the expense and technical requirements are also much greater.

THE PROGRAMS

These programs have great flexibility, yet small compartmentalized functions which preserve precious free memory. Only two, DATA and LIST, are run "as is" for the actual data handling. The others are used in the set-up phase to write the files and programs that are specific for your

```
"VAR"

0 'NAME YOUR VARIABLES by PATRICK KELLY
2 GOTO14
3 BEEP:PRINT"BEGIN WITH A LETTER":RETURN
4 B=VAL(MID$(M(I),1))>0:IFB=-1THENGOSUB3
5 RETURN
6 IFM(I)="END"THENA=I-1:C=A:GOTO21ELSEQ="":INPUT"SET LIMITS
    (N/Y)";Q:IFQ=""ORQ="N"ORQ="n"THEN7ELSE8
7 R(I)=0:S(I)=0:RETURN
8 INPUT"MINIMUM";R(I):INPUT"MAXIMUM";S(I):IFVAL(S(I))<VAL(R(I))
    THENBEEP:GOTO8ELSERETURN
9 FORJ=1TO500:NEXT:RETURN
10 CLS:INPUT"VARIABLE NO.";I:IFI>AORI<1THENBEEP:PRINT:PRINT"YOU
    HAVE"A"VARIABLES":GOSUB9:GOTO10
11 V=M(I):PRINT"CHANGE VAR"I"FROM ("M(I);:INPUT") TO";M(I):T="":
    GOSUB4:IFB=-1THENM(I)=V:GOTO11ELSEGOSUB6:RETURN
12 CLS:D=1:FORI=1TOA:E=(I/7/D=1):PRINT"VAR"I"= "M(I);TAB(18);
    "MN= "R(I);TAB(28);"MX= "S(I):IFE=-1THENINPUT"C)ONTINUE
    S)TOP";V:D=D+1:CLS:IFV="S"ORV="s"THENV="":RETURN
13 NEXT:RETURN
14 CLS:CLEAR1024:DEFINTA-E:DEFSTRM-W:FILES:PRINT
15 INPUT"VARIABLE FILE";P:IFLEN(P)>4THENBEEP:GOTO15
16 CLS:P=P+"/V";N=",":O="PL":OPENPFOROUTPUTAS1:INPUT"MAX. NUMBER
    OF VARIABLES";A:DIMM(A),R(A),S(A)
17 PRINT@40,"CODE FOR MISSING VALUES":PRINT"(IF YOU DON'T WANT ONE,
    TYPE X)":PRINT@63," ";:INPUT"";U:PRINT:PRINT"CODE FOR QUESTIONS
    NOT APPLICABLE";:INPUT"";W:IF(W=U)*(W<>"X")=1THENCLS:GOTO17
18 FORI=1TOA:C=C+1:CLS:PRINT"TYPE END TO EXIT"
19 PRINT"VAR"I;:INPUT"= ";M(I):GOSUB4:IFB=-1THEN19
20 GOSUB6:NEXT
21 INPUT"R)EVIEW  C)ORRECT  S)AVE";T:IFT=""ORT="R"ORT="r"THENGOSUB12:GOTO21
22 IFT="C"ORT="c"THENGOSUB10:GOTO21
23 IFT="S"ORT="s"THEN24ELSEBEEP:CLS:T="":GOTO21
24 PRINT#1,MID$(STR$(C),2)+N+U+N+W:FORI=1TOA:PRINT#1,M(I)+N+R(I)+N+S(I):
    NEXT:CLOSE:CLS:PRINT@130,P" SAVED":BEEP:GOSUB9:MENU
```

Listing 1. VAR *allows you to name the variables you'll be using in this system.*

```
"CWRITE"

0 'CONSISTENCY CHECKING PROGRAM WRITER - MARIE FRANCE LAFONTAINE
    & STAN MUSGRAVE
1 CLS:CLEAR1024,MAXRAM:MAXFILES=2:DEFSTRM-W:DEFINTA-L:FILES:PRINT
2 INPUT"VARIABLE FILE";M:N=M+"/V":O=M+"/C.DO":P=M+"/L":C=10
3 CLS:OPENOFOROUTPUTAS2:PRINT#2,"1 ONERRORGOTO2:KILL";CHR$(34);O
4 GOSUB19:OPENNFORINPUTAS1:INPUT#1,A,B,D:Q=""
5 E=300:PRINT#2,"35 DIMV(";MID$(STR$(A),2);")":PRINT#2,E"FORF=1TO";
    MID$(STR$(A),2);":INPUT#1,V(F):NEXT":E=E+1
6 CLOSE1:OPENPFORINPUTAS1:Q="":CLS
7 IFEOF(1)THEN16ELSEG=G+1:PRINT@130,G
8 INPUT#1,M,R,W$
9 IFLEN(M)>0THENQ=Q+M
10 IFLEN(R)>0THENI=I+1:S=S+R+",":Q=Q+" THEN J=J+1:B$(J)=
    A$("+MID$(STR$(I),2)+")":T=":"ELSET=" THEN "
11 IFLEN(S)>90THENC=C+1:S=LEFT$(S,LEN(S)-1):PRINT#2,C"DATA "S:S=""
12 IFVAL(W)<300ANDVAL(W)<>0THENW=STR$(E+VAL(W)+1)
13 IFW="END"ORW="FIN"THENW=STR$(700)
14 IFVAL(W)>0THENQ=Q+T+"GOTO "+W
15 PRINT#2,E;Q:Q="":E=E+1:GOTO7
16 CLOSE1:IFI>10THENPRINT#2,10"DIMA(";MID$(STR$(I),2)"),
    A$("MID$(STR$(I),2)")"
17 IFLEN(S)>0THENS=LEFT$(S,LEN(S)-1):PRINT#2,C+1"DATA "S
18 PRINT#2,C+2"FORK=1TO";MID$(STR$(I),2);":READA$(K):NEXT":
    CLOSE2:PRINT@130,"TYPE SAVE"+CHR$(34)+LEFT$(O,LEN(O)-3):LOADO
19 PRINT@130,"WORKING...":OPEN"CLINES.DO"FORINPUTAS1
20 LINEINPUT#1,M:IFEOF(1)THEN22
21 PRINT#2,M:GOTO20
22 CLOSE1:RETURN
```

Listing 2. CWRITE *creates a program that checks your data for internal consistency.*

data fields.

The programs, written in BASIC, work as a series of steps that progressively handle the survey information. Figure 1 shows how the programs relate to each other in the process of variable coding, data entry and error checking. The programs are given in listings one through five. As the programs run, they provide a series of simple screen prompts which should be sufficient to operate the programs. They are designed for use by personnel with little or no prior computer experience. A detailed instruction manual which explains all the permutations and possibilities, common errors, as well as the programs on tape or disk, is available from the authors for $9.00. The programs are also available with French screen prompts.

After you have created a questionnaire with an associated list of variables, codes, limits and logical relations, the first program (VAR, short for variable creation) takes this information to create a file QQQQ/V, (where "QQQQ" is up to 4 characters of your choice, enter only the "QQQQ," the program will add the "/V") which names the variables and the ranges that will be accepted for them (e.g. 14-54 for maternal age). The name can even include a brief form of the question to be asked, as this "name" will be what appears as the screen prompt in the data entry program. Line 16 requests the number of variables or an estimated maximum in order to dimension an array. Line 17 requests values for

The programs provide a series of simple screen prompts

```
0 'CONSISTENCY CHECKING, MARIE FRANCE LAFONTAINE & STAN MUSGRAVE
2 CLS:CLEAR1024,MAXRAM:MAXFILES=2:DEFINTA-K:DEFSTRM-P
25 FILES:PRINT:INPUT"DATA FILE ";M:INPUT"ERROR FILE";N:CLS
30 OPENMFORINPUTAS1:OPENNFOROUTPUTAS2
32 PRINT#2,M:PRINT#2,"":PRINT#2,"CASE  VARIABLES TO VERIFY":PRINT#2,""
40 IFEOF(1)THEN800ELSEA=A+1:PRINT@130,A
50 INPUT#1,B
700 O=STR$(B)
710 FORK=1TOJ:O=O+"  "+B$(K):NEXT
720 IFJ>0THENPRINT#2,O:C=C+1:J=0
730 GOTO40
800 CLOSE:IFC=0THENPRINT@130,"THE DATA IS CLEAN":BEEP:N=N+".DO":KILLN:GOTO850
810 P="CASES TO VERIFY"
812 CLS:PRINT@130,"THERE ARE ";C;P:BEEP:BEEP:BEEP
850 FORE=1TO500:NEXT:MENU
```

Listing 3. CLINES *contains the code read and used by* CWRITE.

```
"DATA"

0 ' DATA ENTRY - PATRICK KELLY
2 CLEAR1024:GOTO20
3 IFA=1THEN5
4 FORI=1TOB:PRINT#1,M(I-1)+S1;:NEXT
5 PRINT#1,M(B):RETURN
6 CLS:INPUT"VARIABLE NO.";I:IFI>AORI<1THENBEEP:PRINT:PRINT"YOU
    HAVE"A"VARIABLES":FORI=1TO500:NEXT:GOTO6
7 PRINT"CHANGE VAR"I"("N(I-1)") FROM "M(I-1)" TO ";:LINEINPUT"";
    M(I-1):Q="":RETURN
8 CLS:D=1:PRINT"CASE #"C:FORI=1TOA:E=(I/6/D=1):PRINT"VAR"I"("N(I-1)")
    =";TAB(12+F);M(I-1)
9 IFE=-1THENINPUT"C)ONTINUE S)TOP";Z:D=D+1:CLS:PRINT"CASE #"C:
    IFZ="S"ORZ="s"THENCLS:RETURN
10 Z="":NEXT:Q="":RETURN
11 KEYSTOP:CLS:FILES:PRINT:INPUT"VARIABLE FILE";P:IFRIGHT$(P,2)=
    "/V"THENBEEP:GOTO11
12 RETURN
13 GOSUB11
14 INPUT"DATA FILE";P1:IFLEN(P1)=3THENBEEP:GOTO14
15 GOTO22
16 G=1:GOSUB11
17 INPUT"DATA FILE (3 LETTERS)";P1:IFLEN(P1)<>3THENBEEP:GOTO17
18 INPUT"NUMBER OF FIRST CASE";V:IFV=""THENC=0ELSEC=VAL(V)-1
19 GOTO22
20 DEFINTA-L:DEFSTRM-Z:CLS:S1=",":LINE(20,20)-(224,34),1,B:PRINT@124,
    "CREATION OF A DATA FILE":KEYON:PRINT@280,"NEW  CONT";:ONKEYGOSUB16,13
21 GOTO21
22 T=".DO":U=P1:P=P+"/V":P1=P1+T:CLS:OPENPFORINPUTAS1:INPUT#1,A,H,H1:
    B=A-1:DIMM(B),N(B),O(B),R(B),S(B):F=0:FORI=1TOA:INPUT#1,N(I-1),
    R(I-1),S(I-1):L=LEN(N(I-1)):IFF<LTHENF=L
23 NEXT:CLOSE:ONERRORGOTO42:IFG=0THENOPEN"T"FORINPUTAS1:FORI=1TOA:
    INPUT#1,M(I-1):NEXT:CLOSE
24 OPENP1FORAPPENDAS1:IFG=1THEN26
25 C=VAL(MID$(P1,4,3))
26 CLS:C=C+1:PRINT"CASE #"C:FORI=1TOA:K=(I>6):K1=(I=6):J=I:IFI>7THENJ=7
27 PRINT@40*J,"VAR"I"("N(I-1)") =";:O(I-1)="":PRINT@12+F+40*J,"";:
    LINEINPUT"";O(I-1):IFR(I-1)="PL"ORVAL(O(I-1))=HORVAL(O(I-1))=
    H1ORO(I-1)=""THEN32
28 IFVAL(O(I-1))<VAL(R(I-1))ORVAL(O(I-1))>VAL(S(I-1))THEN29ELSE32
29 BEEP:W="":INPUT"OUT OF LIMITS,.IS IT CORRECTE (N/Y) ";W:IFW=
    "Y"ORW="y"THENPRINT@40*(J+1+2*K+K1),STRING$(39," ")ELSE31
30 GOTO32
31 PRINT@40*(J+2*K+K1),STRING$(39," ");PRINTSTRING$(39," "):GOTO27
32 IFO(I-1)<>""THENM(I-1)=O(I-1)ELSEPRINT@12+F+40*(K+J),M(I-1)
33 NEXT
34 Q="":INPUT"R)EVIEW A)DD C)ORRECT S)AVE";Q:IFQ=""ORQ="R"ORQ="r"THEN
    GOSUB8:GOTO34
35 IFQ="A"ORQ="a"THEN50
36 IFQ="C"ORQ="c"THENGOSUB6:GOTO34
37 IFQ="S"ORQ="s"THEN38ELSEBEEP:CLS:GOTO34
38 IFC<10THENZ="00":GOTO40
39 IFC<100THENZ="0"ELSEZ=""
40 X=STR$(C):X=MID$(X,2,LEN(X)):Y=X:X=Z+X+S1:PRINT#1,X;:GOSUB3:
    IFQ="A"ORQ="a"THEN26
41 CLOSE:U=LEFT$(U,3)+Y+T:NAMEP1$ASU$:OPEN"T"FOROUTPUTAS1:GOSUB3:
    CLOSE:CLS:PRINT@130,U" SAVED":BEEP:FORI=1TO500:NEXT:MENU
42 RESUME24
50 IFFRE(0)>350THEN38ELSECLS:SOUND750,50:Q="S":PRINT@124,"OUT OF
    MEMORY":SOUND750,100:GOTO38
```

Listing 4. DATA *is the main data entry program.*

special codes that you may want to use for missing values and questions that are not applicable. They would be out of range values such as "-9," yet still are accepted by the data entry program.

It is important that the characteristics recorded in different variables for one case be internally consistent. In our work it is not uncommon to have two children of one mother reported (impossible as it may be) as having birthdates only 5 months apart. Similarly, a forester might have a tree reported as having a height which is impossible for that species. Therefore the logical relations among the variables are then written using the TEXT editor, in a

It is important that the variables be internally consistent.

file (call it QQQQ/L) using a standardized format which allows branching and the inclusion of a "message" to describe which variables need verification. For each logical relation, this format is:

1) the logical condition written as;
   A) an 'IF "condition"' statement, or
   B) an 'IF "condition" THEN "action"' statement, or
   C) a mathematical statement,
      -where any data variables are referred to by their number as 'V(n)', and memory variables 'AA' to LZ' are legal,
      -followed by a comma and
2) a message text if desired, followed by a comma and
3) a number of lines to skip, if desired.

```
0 'PRINT DATA - PATRICK KELLY
2 GOTO1
3 DIMN(A),O(A),B(A):O(0)="3":RETURN
4 CLS:CLEAR512:DEFINTA-L:DEFSTRM-Z:FILES:INPUT"VARIABLE FILE";M:
    IFRIGHT$(M,2)="/V"THENBEEP:GOTO4
5 INPUT"DATA FILE ";R:IFLEN(R)<4THENBEEP:GOTO5
6 M=M+"/V":Q=LEFT$(R,3)+"/P":OPENMFORINPUTAS1:INPUT#1,A,N$,VM$:
    CLOSE:GOSUB3:MW%=LEN(VM$):ONERRORGOTO7:OPENQFORINPUTAS1:GOTO13
7 RESUME8
8 CLS:FORI=1TOA:B(I)=MW%:NEXT:OPENRFORINPUTAS1
9 ONERRORGOTO11:INPUT#1,O:C=C+1:PRINT@128,C:FORI=1TOA:INPUT#1,O(I):
    IFB(I)<LEN(O(I))THENB(I)=LEN(O(I))
10 NEXT:GOTO9
11 RESUME12
12 CLOSE:OPENQFOROUTPUTAS1:PRINT#1,A:FORI=1TOA:PRINT#1,B(I):NEXT:CLOSE:GOTO14
13 INPUT#1,A:FORI=1TOA:INPUT#1,B(I):NEXT:CLOSE
14 CLS:LINEINPUT"TITLE:";S:IFLEN(S)>33THENBEEP:PRINT"32 CHARACTERS OR
    LESS, PLEASE":GOSUB50:GOTO14
16 D=3:OPENRFORINPUTAS1
17 PRINT@40,"FIRST VARIABLE";:INPUT"";Y:IFY=""THENE=1:PRINT@58,E:GOTO20
18 E=VAL(Y):IFE<1ORE>ATHENGOSUB51ELSE20
19 GOTO17
20 PRINT@80,"LAST VARIABLE";:INPUT"";Y1:IFY1=""THENF=A:PRINT@98,A:GOTO23
21 F=VAL(Y1):IFF<EORF>ATHENGOSUB51ELSE23
22 GOTO20
23 FORI=ETOF:D=D+B(I)+1:NEXT:IFD>80THENLPRINTCHR$(27)CHR$(77);
24 IFK>0THEN26
25 INPUT#1,K:CLOSE:OPENRFORINPUTAS1
26 PRINT@120,"FIRST CASE";:INPUT"";T:IFT=""THENG=K:PRINT@132,G:GOTO29
27 G=VAL(T):IFG<KORG>VAL(MID$(R,4))THENGOSUB51ELSE29
28 GOTO26
29 PRINT@160,"LAST CASE";:INPUT"";Z:IFZ=""THENZ=MID$(R,4):PRINT@173,Z:
    J=VAL(Z):GOTO32
30 J=VAL(Z):IFJ>VAL(MID$(R,4))ORJ<GTHENGOSUB51ELSE32
31 GOTO29
32 LPRINTS:LPRINT"C\V ";:IFE=FTHEN33ELSEFORI=ETOF-1:H=(I>9):
    U=MID$(STR$(I),2):LPRINTU;SPACE$(B(I)+H);:NEXT
33 LPRINTMID$(STR$(F),2):IFG=KTHEN35
34 FORI=KTOG-1:LINEINPUT#1,V:NEXT
35 ONERRORGOTO38:FORL=GTOJ
36 FORI=1TOA+1:INPUT#1,N(I-1):NEXT:LPRINTN(0)+" ";:IFE=FTHEN37ELSE
    FORI=ETOF-1:LPRINTN(I);SPACE$((B(I)+1)-LEN(N(I)));:NEXT
37 LPRINTN(F):NEXT
38 CLOSE:LPRINT:LPRINT:LPRINT:CLS:W="":INPUT"PRINT AGAIN? (N/Y) ";W:
    IFW="Y"ORW="y"THEN40
39 Q=Q+".DO":KILLQ:MENU
40 S="":T="":Y="":Y1="":Z="":GOTO14
50 FORJ1=1TO1000:NEXT:RETURN
51 BEEP:CLS:PRINT,"THAT IS NOT POSSIBLE":GOSUB50
52 RETURN
```

Listing 4. LIST sends your variables list to a printer so you can proofread them for typographical errors and other mistakes.

As an example, we wanted to confirm that the birth and death dates of children have a logical order so that the child is not reported as dying before it was born. If the month of birth is recorded in variable 4, the year of birth is variable 5, the month of death is in 6 and the year of death is in 7, then the expression *IF V(4)+ V(5)* 12> V(6)+ V(7)* 12, DATES REVERSED, 3* contains information which will cause the birth and death dates to be compared. This is followed by the message to be recorded if the condition is met (that the dates are reversed) and the number of following lines of consistency checking to be skipped.

This same mechanism can alternatively be used to pick out cases which meet certain criteria. You would have it examine the data for the specific criteria which you wish to identify. It would then print out a list of these cases.

A second program (CWRITE) takes the variable and logic files and writes the program lines necessary to perform the consistency checking. It merges the lines from (CLINES), writes it into a document file (QQQQ/C), loads and runs it. This erases the document file and leaves you with the consistency checking program.

A third program (DATA) takes the output of the variable definition program and uses it to enter the data into a data file, ("XXXNNN.DO," where "xxx" is an abreviation of your choice and "nnn" is the number of cases in the file.) It checks the data

against the specified range and allows correction of mistakes.

The data file may be used in three ways. The first is as input in the consistency checking program (QQQQ/C) which checks for logical errors in the data. The output of this program is a document file "EEEEEE.DO" where the numbers of the cases with variables to be confirmed are recorded along with the descriptive message. These may then be reviewed by the supervisor and interviewer and accepted, corrected or listed for re-interview.

Second, the data file may be printed (by LIST) so that the values may be proof-read for typographical errors or checked further by the supervisor for cases which need re-interviewing. Line 23 in LIST ends with "LPRINT" and a control code for condensed print. You should substitute the code appropriate for your printer.

The third use of the data file is as the input for analysis. This can occur at any stage of the above process. It can be done with separate programs which run on the Model 100-102 and transform or sort variables, generate frequency distributions, means, medians, standard deviations, histograms, etc. Alternatively, a copy of the file can be sent directly by cable or indirectly via diskette or cassette to another computer capable of more sophisticated analysis.

THE SYSTEM

The use of this system was chosen because of the way its features respond to the problems posed above.

- The Model 100/102 are small, light, inexpensive, yet highly capable machines with a history of dependable service under rough conditions.
- The programs are designed to be flexible and user-friendly. They provide screen prompts which lead the user through the programs. They are designed in sections which serve distinct functions and which are easily re-used and tailored to fit many different sets of variables and data. Yet for actual data entry only a minimum needs to remain in RAM.
- The training requirements are low. We elected to have our interviewers record their findings on paper forms. They transferred the data to computer files with the supervisor or assistant in one process which could simultaneously encompass data coding, entry, verification, and supervisory review. This had the added benefit of eliminating the time, labor and financially costly separate steps traditionally used to get the data "into shape" for analysis.

Our supervisors had no prior computer experence. In order to use the data entry programs, they were given training in the general use of the Model 100/102 and program specific skills. This consisted of four two-hour sessions prior to the start of operations and several hours of operations under supervision.

Our supervisors had no computer experence.

There does need to be at least one individual with math skills capable of writing the logical statements desired for the consistency checking program. Although programming skills are helpful, this does not require any familiarity with BASIC.

If interviewers of greater capability are available and acceptable, they could use the Model 102 and data entry system at the actual interview site.

The use of laptop computers in this field survey provided the research team with high quality data available for analysis in a very short time at a reasonable cost. Interim estimates of results could be made to confirm that the data was being correctly gathered. A few days after initial data collection was completed, we were able to provide estimates that varied little from those given after final efforts at follow-up and correction were completed, over a month later. The investment in supervision in the field meant that the staff and time needed for office editing was greatly reduced. It also increases the likelihood of errors in the data file being detected early when they are easily corrected.

In-field data control was an important asset since it made the interviewers aware that careful attention was being paid to their work. We found that this early feedback to interviewers influenced the quality of further interviews.

Thus we found that using laptop computers and these data handling programs was a significant aid to high quality senior level staff supervision. ❑

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The Missing Link

Convert your Model 100/102 computer into a TI-59 calculator.

by Rudy E. Kokich, M.D.

A week ago, the capricious but faithful TI-59 calculator lost my confidence. I asked for a cosine of 1.5 degrees, it gave me the answer of negative infinity. I asked for the solution of 2+2, it gave me the answer of negative infinity. In fact, no matter what problem I gave it, the answer was always negative infinity. Perhaps the old fellow was merely trying to tell me that, in some cosmic sense, *all* my inquiries lead to negligible, insignificant answers. Which may be quite true... Still, I have little use for a calculator which presumes to demean man's destiny, especially in such a consistent, single-minded fashion.

I disposed of the calculator with all due gratitude for past service and faced the awful truth: with three computers in my possession, I had no practical way to add up 2 and 2. The desktops would be outright indignant at such a simple undertaking. Only my secretaries, who take no nonsense from any living or inanimate object, know how to keep them occupied. The Model 100, on the other hand, which I use almost exclusively, seemed more amenable. However, when I entered *Basic* and attempted to add up two numbers, the computer modestly kept the answer to itself, unless coaxed to display it on the screen. In the case of calculating machines, at least, reluctance is clearly not a virtue.

```
1 CLEAR 1040:FOR N=0 TO 17:READ X
  :D$=D$+CHR$(X):NEXT N
2 B$="":M=0:P=4*ATN(1):D=360/(2*P)
  :E=2.7182818284593:C=LOG(10)
  :ON ERROR GOTO 13:GOSUB 12:D$=""
3 I$=INKEY$:IF I$="" THEN 3 ELSE I=ASC(I$)
  :IF I=61 THEN I$="+"
   ELSE IF I=59 THEN I$="/"
   ELSE IF I=39 THEN I$="*"
   ELSE IF I=8 THEN B$=LEFT$(B$,LEN(B$)-1)
  :GOSUB 12:PRINT B$;:I$=""
   ELSE IF I=13 THEN 5
4 B$=B$+I$:PRINT I$;:I$="":GOTO 3
5 I$="":PRINT:F=INSTR(B$,"X")+INSTR(B$,"x")
  :A$="Y="+B$+CHR$(0)
6 IF M=1 THEN GOSUB 12:PRINT B$
7 IF F=0 THEN 8 ELSE LINE INPUT"  X  = ";X$
  :X=ASC(X$):IF X=82 OR X=114 THEN X=R
  :GOTO 8 ELSE IF X=83 OR X=115 THEN X=S
  :GOTO 8 ELSE IF X>57 OR X<45 THEN ERROR
   ELSE X=VAL(X$)
8 A=VARPTR(A$):B=PEEK(A+1)+256*PEEK(A+2)
  :CALL 1606,0,B:CALL 2499,0,63105
  :PRINT"f(X) =";Y:R=Y
9 C$="":M=1:CALL 17001
  :PRINT@280," S-save f(x)  X-new X  C-clear  Q-quit ";
  :CALL 17006
10 C$=INKEY$:IF C$="S" OR C$="s" THEN S=Y
   :PRINT@280,"SAVED f(X)  ";
11 IF C$="C" OR C$="c" THEN 2
    ELSE IF C$="X" OR C$="x" THEN 6
    ELSE IF C$="Q" OR C$="q" THEN CLS:MENU
    ELSE C$="":GOTO 10
12 CLS:CALL 17001
   :PRINT@280,STRING$(31,32);"p d e c ";
   :PRINT@280," S =";S;D$;
   :PRINT@0," CALCULATOR-I ";CHR$(239);CHR$(239);CHR$(233);"R";CHR$(234);
   :CALL 17006:PRINT"=";R;
   :PRINT@80,"f(X) = ";
   :RETURN
13 BEEP:PRINT"Error...":RESUME 9
14 DATA 32,32,32,32,32,82,46,75,79,75,73,67,72,32,49,57,56,55
```

Listing 1. CALC-I *turns your Model 100/102 into a TI-59 handheld calculator.*

THE SOLUTION

I wrote CALC-I in response to the implicit plea for common sense by the thousands of students and professionals of all kinds who use the Model-100 computer, yet need to carry along a ten dollar calculator for simple mathematical functions. At the same time, I attempted to solve the problem faced by Alan Zeichick (The Plot Thickens; Portable 100, November 1987) of developing a

subroutine which prompts for an equation and solves it, without requiring the user to modify the program by entering the equation as a separate program line.

CALC-I is a slide-rule calculator with two memory registers, capable of solving one independent variable equations of up to 115 characters in length.

It supports positive and negative numbers in conventional or scientific notation, all Basic mathematical operations [+, -, *, /, ~,]SQR, SIN, COS, TAN, ATN, LOG, INT, ABS, and parentheses], the constant P for Pi,the constant E for the base of the natural logarithms, the constant C for the conversion between the natural and common logarithms [C=Ln(10); Log (X)=Ln(X)/C], and constant D for the number of degrees in a radian.

The two memory registers, named R and S, can be used for transferring earlier results into new equations, and are constantly displayed on the screen. While S saves a stored value until changed by the user, the register R is automatically updated with the most recent result.

Equations entered into the calculator must be presented as function of the variable X [e.g. X~2+3*X+4]. No other name may be used for the independent variable. If the problem does not contain an independent variable [e.g. 2+3+4-5], the calculator provides the result without prompting for X. If the submitted problem contains the variable X [e.g. 2+SIN(X)], the calculator will prompt for the desired value of X before giving the result. Valid entries for X include a positive or negative number in conventional or scientific notation, the constant R, or the constant S. Constants P, D, E, or C are *not* valid. As the result is displayed, the equation is still retained in memory, and may be solved for new values of X.

If the equation or the X value is entered incorrectly, or if an impossible mathematical solution is sought [e.g. division by zero], the user will be warned with the **Error...** message. This, however, neither alters register contents nor interrupts program execution.

Take note that in BASIC, and therefore in this calculator, trigonometric functions are based on angles measured in *radians*. For example, SIN (3) assumes the angle of 3 radians. To calculate the Sine of 3 degrees, enter the function as SIN(3/D). Cosine and Tangent are handled similarly. The only inverse trigonometric function supported by BASIC is the Arc-Tangent, ATN. The result of ATN(X) is also provided in radians. Entering the function as ATN(X)*D converts the result to degrees. Note also the BASIC treats the LOG function contrary to convention. Although LOG usually implies the *common* logarithm of base 10, and LN the *natural* logarithm of base 2.718, entering LOG(X) will result in the natural logarithm of X. To obtain the common logarithm of X, enter LOG (X)/C. Natural and common antilogs are calculated as E~X and 10~X respectively.

Entry of numbers can be made much faster

KEYBOARD CONSIDERATIONS:

The Model 100's typewriter-style keyboard is not ideally suited for a calculator. Entry of numbers can be made much faster by activating the numeric keypad with the [NUM] key. To further facilitate data entry, I have tried to eliminate the use of the SHIFT key—at least for the four basic operations. Instead of [+] and [*], the program accepts [=] and ['] respectively. Parentheses and [~] still require shifting. Because of its more convenient position, the [;] key may be used instead of [/]. Although the program will accept entry in both upper and lower case letters, I prefer the use of the CAPS LOCK key.

Correction of erroneous entries is done with the [BKSP] key. The arrow keys and [DEL] are not functional.

EXAMPLES:

The program has two screens: the input screen, which asks for a problem with the "f(X)=" prompt; and the result screen, which displays the outcome of the calculation and prompts for further action (save the result, enter new X value, clear the equation to start anew, quit the program. f(X) means "a function of X," an equation which uses X as an independent variable. You may also think of f(X) as meaning the "the result." Remember that the mathematical commands and the hierarchy of operation are exactly as described in the BASIC section of your manual. Although I strove to make CALC-I simple and intuitive, the only intuition I am likely to fulfill, of course, is my own. Several examples will clear up misunderstanding better than explanations.

Press in the [CAPS LOCK] and [NUM] keys and run the program to enter the input screen. Type the following keystrokes in response to the "f(X)=" prompt: *1 - 2 = 3 ' 4 = 1 7 6 5 ; 5* <ENTER>

The problem appears as *f(X) = 1-2+3*4+1765/5*, and the result is displayed as *f(X) = 364*. Using [=] instead of [+] and ['] instead of [*] allows you to avoid shifting. The bottom line of the screen now holds the menu for further options. Press [S] to save the result in the constant memory register S, then press [C] to clear the equation and return to the input screen. Note that in the left lower corner S carries the value of 364, while in the right upper corner the memory register R was automatically updated with the same last result.

To illustrate the display of subtotals in a series of additions and sub-

tractions, let us assume that register R carries the balance of your checking account, $364. Type in the equation R+X, where R is the balance (automatically updated after each operation), and X represents checks and deposits. After pressing <ENTER>, the program prompts for the value of X. Make negative entries for checks and positive for deposits. Type in -14.00 and press <ENTER>. The result should be 350. Press X to select another value of X and note that register R was updated with the current balance. Type in a deposit of 48.12 and press <ENTER> to obtain the final balance of 398.12 on the result screen. Select C for a new equation. Register S continues to hold your original balance.

Now, let us get really serious. Release the [NUM] key and type in a lengthy trigonometric function: *SIN (X/D)+ COS(X/D) + TAN(X/D) + LOG(X)/C + ATN(X)*D + (P/X)~E* <ENTER>. If *X = 45*, the result should be *92.795,116,338,096*. Press S to save this result in the register S, then select X to enter a new X value. Remember that constants P, D, E and C are *not* legal input for X, although they may be used in the equation. This time let X = S or X = R, as both S and R carry the same number, and the solution is *71.817,984,105,919*. Select X again and enter 1E-5 in scientific notation to obtain the result of *8.766,023,026,343,3 E+14*. Press Q to exit the program and return to the main menu.

READING THE LINES:

- Lines 1-2 initiate the program and specify constants P,D,E, and C.
- Lines 3-4 hold a data input loop. each keystroke is saved in I$, which in turn updates B$, the variable that holds the equation. On completion of the equation, entry is terminated and calculation initiated by pressing <ENTER>, just as you would press [=] on a handheld calculator.
- Line 5 tests for the presence of the independent variable X in the equation. If X (or x) is present, the program prompts for the desired value of X before proceeding to calculate the result.
- Line 7 accepts the input for the value of X and tests it for error.
- Lines 9-12 essentially deal with menus and screen displays.
- Line 13 is an error-handling subroutine.
- Line 14 holds data values.

Equation Entry

The very heart of the program is a 100 byte subroutine located at the end of line 5 and in line 8. It may be of further interest for two worthwhile reasons. First, it allows input and solution of an equation in a Basic program, without the need to enter the equation each time as a separate line. Second, it may be applied as rudimentary unit of artificial intelligence. Presuming that intelligence means the ability to alter spontaneously the nature of the relationship between the variables based on previous results, this subroutine could be used as a part of a loop in which the program re-programs itself in response to its environment (user input, data acquisition interface, etc).

The very heart of the program is a 100 byte subroutine

Substituting lines 3 and 4 with a simple INPUT statement, and renumbering for the purpose of discussion, the subroutine appears as shown in Figure 2.

- Line 100 is an input statement, which places the equation into the string variable B$.
- Line 101 tests for the presence of the independent variable "X" or "x" in the equation, and prompts for the value of X before proceeding with calculation. This program was designed for a single independent variable; however any number of them may be used, providing this line is repeated to search for their presence in the equation. When naming independent variables, avoid using A, C, G, I, L, N, O, S, and T, as these characters appear in the *Basic* trigonometric and LOG functions.
- Line 102 prepares a complete *Basic* LET command [LET variable = expression] by adding the prefix "Y=" to the equation in B$. The suffix "CHR$(0)" marks the end of the statement for the ROM routines about to be called. The full command, omitting the optional "LET," is saved in the string variable A$.
- Line 103 finds and saves in the variable A the RAM location where the address of A$ is stored.
- Line 104 calculates and saves in the variable B the beginning address of the contents of A$.
- Line 105 calls the ROM tokenizing routine which converts all *Basic* keywords of A$ into their one byte equivalents (tokens). The new, tokenized line is inserted into memory beginning at location 63105.
- Line 106 calls the ROM routine which evaluates the expression beginning at location 63105, saving the result in the indicated variable Y.
- Line 107 prints the final result contained the variable Y.

Now, imagine what you would have if you expanded the subroutine to change automatically the relationship in B$ depending on the result in Y, then made an array of these nodes. ❑

FIF Is Alive And Well

Metric still hasn't replaced the old-fashioned English system of measurements.

by Gene Burress

In the early 1970's the U.S. government set in motion a ten to fifteen year plan, to convert our standards of measurement from English to metric.

It is now 1987, and there is little, if any indication that we are in the process of conversion. It is noted that some service stations have gone to liters, but most that tried this conversion, have gone back to gallons. Apparently, this was a commercial ploy, and it did not work.

We are accustomed to feet, inches, gallons, pounds, etc., and although the metric system of measurement is more rational, it looks like our use of the English system for measurements, will be with us a long time.

Construction drawings, prepared by architects and engineers, are dimensioned in FIF (Feet, Inches and Fractions of an inch). I don't think anyone would argue with the fact that it is much easier to apply the basic operations of arithmetic (add, subtract, multiply and divide) to the metric system. Since the metric system is based on the powers of ten (decimal system) most of us have retained the ability to add such things as 1.275 ft. plus 1.875 ft. and get 3.150 ft. But, can we still add 1 ft-3 and 5/16-inches and 1 ft-10 and 1/2 inches and come up with 3 ft-1 and 13/16"? How soon we forget what we learned in grade school.

Most computers, using BASIC and having at least 8K RAM, can be

```
10 'FIF OPERATIONS
15 'BY G.E.BURRESS
70 '
80 PRINT"              SELECT CASE":CLEAR
90 PRINT"1- ( + OR -) FIF"
95 PRINT"2- CONV.DEC. TO FIF
100 PRINT"3- CONV. FIF TO DEC."
110 PRINT"4- FIF/FIF     5- MENU"
120 A=VAL(INKEY$)
125 '
130 ON A GOTO 1000,2000,3000,4000,6000:GOTO 120
1000 CLS:PRINT"ADD/SUBTRACT FIF":PRINT
1010 CLEAR:INPUT"HOW MANY NUMBERS?";N
1020 FOR I=1 TO N
1030 INPUT"FT.,IN.,NUMER.,DEMON.";A,B,C,D
1040 GOSUB 3085
1050 LPRINTA;" ";B;" ";C;"/";D
1060 C=C/D/12:B=B/12:E=A+B+C:F=F+E
1072 NEXT I
1075 GOSUB 5000
1110 PRINT"       TOTAL **** ";A2;" ";A5;" ";B$
1111 LPRINT"         TOTAL **** ";A2;CHR$(39);
1112 LPRINT CHR$(45);A5;" ";B$;CHR$(34)
1115 LPRINT
1116 LPRINT
1117 PRINT
1120 PRINT"MORE, NEW, QUIT OR X  M/N/Q/X?"
1130 A$=INKEY$:IF A$="" THEN 1130
```

continued

Listing 1. Use this program to check dimensions and calculate alterations.

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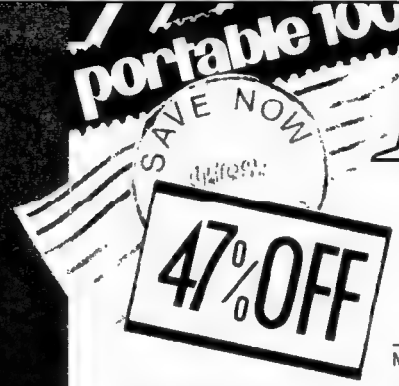

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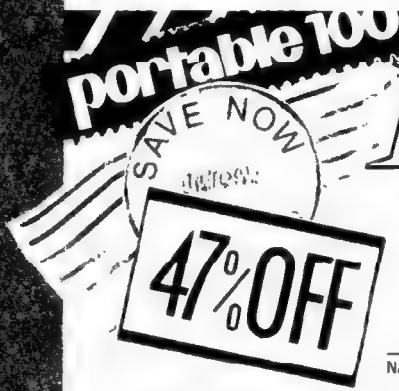

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5	30	55	80	105	130	155	180	205	230	255	280
6	31	56	81	106	131	156	181	206	231	256	281
7	32	57	82	107	132	157	182	207	232	257	282
8	33	58	83	108	133	158	183	208	233	258	283
9	34	59	84	109	134	159	184	209	234	259	284
10	35	60	85	110	135	160	185	210	235	260	285
11	36	61	86	111	136	161	186	211	236	261	286
12	37	62	87	112	137	162	187	212	237	262	287
13	38	63	88	113	138	163	188	213	238	263	288
14	39	64	89	114	139	164	189	214	239	264	289
15	40	65	90	115	140	165	190	215	240	265	290
16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
20	45	70	95	120	145	170	195	220	245	270	295
21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
23	48	73	98	123	148	173	198	223	248	273	298
24	49	74	99	124	149	174	199	224	249	274	299
25	50	75	100	125	150	175	200	225	250	275	300

1. Which portable(s) do you own?
- A. ☐ Model 100
- B. ☐ Tandy 102
- C. ☐ Tandy 200
- D. ☐ Tandy 600
- E. ☐ NEC 8201
- F. ☐ Olivetti M10

2. What are your most important applications for your portable?
- A. ☐ Word Processing
- B. ☐ Database Management
- C. ☐ Telecommunications
- D. ☐ Programming
- E. ☐ Scheduling/Time Management
- F. ☐ Spreadsheets
- G. ☐ Other_____

3. Do you use your portable for...
- A. ☐ Business Use
- B. ☐ Personal Use
- C. ☐ Both of the above

4. What peripherals and accessories do you currently own for your portable?
- A. ☐ Disk Drive
- B. ☐ Memory Upgrade (RAM)
- C. ☐ Accessory ROM Pac
- D. ☐ Modem
- E. ☐ Printer
- F. ☐ Tape Drive

5. What peripherals and accessories do you plan to purchase for your portable during the next 6 months?
- A. ☐ Disk Drive
- B. ☐ Memory Upgrade (RAM)
- C. ☐ Add-On ROM
- D. ☐ Modem
- E. ☐ Printer
- F. ☐ Tape Drive
- G. ☐ Carrying Case

6. How much do you plan to spend on portable computer hardware, software, and peripherals during the next 6 months?
- A. ☐ less than $100
- B. ☐ $100–$250
- C. ☐ $250–$400
- D. ☐ $400–$600
- E. ☐ $600–$750
- F. ☐ more than $750

7. How often do you use on-line services?
- A. ☐ Daily
- B. ☐ Weekly
- C. ☐ Monthly
- D. ☐ Other_____

8. In what type of business do you use your portable?
- A. ☐ Journalism
- B. ☐ Insurance
- C. ☐ Retail
- D. ☐ Education
- E. ☐ Science or Engineering
- F. ☐ Business
- G. ☐ Other_____

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16	41	66	91	116	141	166	191	216	241	266	291
17	42	67	92	117	142	167	192	217	242	267	292
18	43	68	93	118	143	168	193	218	243	268	293
19	44	69	94	119	144	169	194	219	244	269	294
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21	46	71	96	121	146	171	196	221	246	271	296
22	47	72	97	122	147	172	197	222	247	272	297
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P100B-2

used. to apply basic arithmetic to FIF. A printer is handy if you need to document your calculations, but not absolutely necessary.

What follows are not complete programs, but routines that can be used to arrive at accurate answers, using only FIF. These routines (written on a TRS-80 Model 100) will allow you to perform any arithmetical operation on FIF and your answers will be in FIF. Programming is fun and educational, so use these routines and write your own customized programs. You will be able to add, subtract, multiply, divide and solve trigonometry problems, which will be beneficial to architects, engineers, detailers, draftpersons, and students. And again, your answers will be in FIF.

Programming is fun and educational

Keep in mind that there is a conversion process necessary in these routines, that is, FIF to decimal and decimal to FIF and a couple of tricks that provide accuracy.

GETTING STARTED

Use comma delimeters to input data: *10 INPUT"FIF"; A, B, C, D*

Say you want to enter 12ft-4 and 7/8-inches. OK, the keystrokes would be *12,4,7,8* (ENTER), or if you are subtracting it would be *-12,4,7,8* (ENTER). Don't try to subtract any FIF that will give you a negative answer, unless you are in the middle of a series of dimensions. Just make sure the total FIF is greater than line 1110 that follows).

Here's an example of a proper list of entries (in line 1010, N=5):

```
1140 IF A$="N" OR A$="n" THEN 80
1145 IF A$="M" OR A$="m" THEN 1010
1150 IF A$="X" OR A$="x" THEN 7000 ELSE 6000
2000 CLS:PRINT"DEC. TO FIF"
2010 CLEAR:INPUT"ENTER DEC. FT.";F
2020 GOSUB 5000
2030 PRINTCSNG(F);"DEC.=";A2;" ";A5;" ";B$:PRINT
2035 LPRINT CSNG(F);"DEC.=";A2;"  ";A5; "  ";B$
2040 PRINT "MORE,QUIT NEW OR X M/Q/N/X?"
2050 A$=INKEY$:IF A$="" THEN 2050
2060 IF A$="M" OR A$="m" THEN 2010
2070 IF A$="N" OR A$="n" THEN 80
2080 IF A$="X" OR A$="x" THEN 7000 ELSE 6000
3000 CLS:PRINT"FIF TO DEC.":CLEAR
3010 CLEAR:INPUT"FT.,IN.,NUMER., DENOM.";A,B,C,D
3020 LPRINT:LPRINT A;" ";B;" ";C;"/";D;"  ";
3025 GOSUB 3085
3030 C=C/D/12:B=B/12:E=A+B+C
3040 LPRINT "=";:LPRINT USING "####.####";E:LPRINT
3050 PRINT"MORE,QUIT OR NEW  M/Q/N?"
3060 A$=INKEY$:IF A$="" THEN 3060
3070 IF A$="M" OR  A$="m" THEN 3010
3080 IF A$="N" OR A$="n" THEN 80 ELSE 6000
3085 IF SGN(A)=-1 THEN B=-B
3086 IF SGN(A)=-1 OR SGN(B)=-1 THEN C=-C
3088 IF C=0 THEN D=16
3090 RETURN
4000 CLS:PRINT "FIF/FIF":CLEAR
4010 INPUT "1st FIF FT.,IN.,NUM.,DEN.,";A,B,C,D
4020 LPRINT A;" ";B;" ";C"/";D
4025 IF D=0 THEN D=16
4030 C=C/D/12:B=B/12:E=A+B+C
4040 INPUT"2nd FIF FT.,IN.,NUM.,DEN.,";A,B,C,D
4050 LPRINT A;" ";B;" ";C;"/";D
4055 IF D=0 THEN D=16
4060 C=C/D/12:B=B/12:H=A+B+C
4070 G=E/H
4080 LPRINT CSNG(G);" ";"=tangent"
4082 PRINT CSNG(G);" ";"= tangent"
4085 AM=ATN(G):AM=AM*57.29578
```

continued

23,4,5,16
-5,6,3,8
2,7,1,2
0,0,-5,8
0,-6,15,16

The answer should be *19'-9 7/8"*.

The program converts everything to decimal ft. so the computer can handle the transaction. (A=12, B=4, C=7, D=8).

1060 C=C/D/12 = 0.0729167
1062 B=B/12 = 0.3333333
1064 E=A+B+C = 12.4062500
1065 F=F+E = (to accumulate)
1072 NEXT I (See loop below).

NUMBER OF ENTRIES

Of course, we will be dealing with more than one FIF, so we initially set up a loop, to handle as many entries as we want to arrive at line 1065.

This routine will prevent error messages.

Set up a loop by first asking how many number you plan to enter: *1010 CLEAR: INPUT "How many numbers?"; N*

SUBTRACTION

Suppose we want to subtract some FIF. We use a subroutine which tests all entries.

3085 IF SGN(A)=-1 THEN B=-B
3086 IF SGN(A)=-1 OR SGN(B)=-1 THEN C=-C
3087 IF C=0 THEN D=16
3090 RETURN

Line 3087 precludes division by 0. Dividing a number by 0 is infinity, which is undefined. Dividing 0 by a number is zero. So, in entering FIF which may contain 0's of negative

```
4086 LPRINT" Angle,deg.=";CSNG(AM)
4087 PRINT "Angle,deg.=";CSNG(AM)
4090 F=G:GOSUB 5000
4092 PRINT "Slope=";A2;" ";A5;" ";B$
4100 LPRINT"Slope=";A2;" ";A5;" ";B$;"  per 12 inches"
4110 AM=ATN(AL*57.29578)
4112 HY=SQR(E^2+H^2):F=HY:GOSUB 5000
4113 PRINT "Hypot.= ";A2;" ";A5;" ";B$
4115 LPRINT"Hypot.= ";A2;" ";A5;" ";B$
4116 LPRINT:LPRINT
4130 PRINT"MORE,NEW,OR QUIT M/N/Q?"
4135 A$=INKEY$:IF A$="" THEN 4135
4140 IF A$="M" OR A$="m" THEN 4000
4150 IF A$="N" OR A$="n" THEN 80 ELSE 6000
5000 A1=F:A2=INT(A1):A3=A1-INT(A1):A4=A3*12:A5=INT(A4)
5010 A6=A4-INT(A4):A6=A6*16:A6=A6+.5:A6=INT(A6)
5020 IF A6=16 THEN A6=0:IF A6=0 THEN A5=A5+1
5030 IF A5=12 THEN A5=0 :IF A5=0 THEN A2=A2+1
5040 IF A6=0 THEN B$="0/16"
5050 IF A6=1 THEN B$="1/16"
5055 IF A6=2 THEN B$="1/8"
5060 IF A6=3 THEN B$="3/16"
5065 IF A6=4 THEN B$="1/4"
5070 IF A6=5 THEN B$="5/16"
5075 IF A6=6 THEN B$="3/8"
5076 IF A6=7 THEN B$="7/16"
5077 IF A6=8 THEN B$="1/2"
5078 IF A6=9 THEN B$="9/16"
5079 IF A6=10 THEN B$="5/8"
5080 IF A6=11 THEN B$="11/16"
5081 IF A6=12 THEN B$="3/4"
5082 IF A6=13 THEN B$="13/16"
5083 IF A6=14 THEN B$="7/8"
5085 IF A6=15 THEN B$="15/16"
5090 RETURN
6000 MENU
7000 INPUT "DEC. MULTIPLIER";M
7010 F=F*M:GOSUB 5000
7020 GOTO 1110
7029 END
```

End of listing.

numbers (subtraction), this routine will prevent error messages.

CONVERTING TO FIF

Once we have an answer, say 12.40625, we need to convert it back. This is done with lines 5000 to 5090.

In our example above, you will find: A1= 12.40625, A2= 12, A3= 0.40265, A4= 4.875, A5= 4, A6= A4-INT(A4)= 0.875, A6= A6*16= 14, A6= A6+.5= 14.5, A6= INT(A6)= 14

The elements for FIF are therefore, A2=12 (feet), A5=4 (inches) and A6=14 (numerator of fraction of an inch in 16th's i.e., 14/16). Line 5083 will reduce the improper fraction of 14/16 to 7/8. Lines 5020-5030 will reduce improper FIF, such as 12-12 and 16/16" to 13'-1". The little trick for accuracy is line 5010 (A6=A6+.5), which in effect rounds off to the nearest integer. If A6 ends up 1.999 you want 2 as an integer, not 1.

PRINTING

The elements to print are A2, A5, and B$. The program line might be *1110 PRINT" Total+ ";A2;" ";A5;" "B$*, or *1110 PRINT" Total= "; A2; CHR$(39); CHR$(45); A5; " "; B$; CHR$(34)*

I suggest that early in your programs, you define your variables as single precision. Six places is more than ample for the use of decimals, will save memory space, and allow the computer to operate faster.

With the routines above, you will be able to write programs to solve problems involving trigonometry, circles, (chords, segment areas, arcs, etc.), slopes, and offsets using only FIF, with no manual conversion to decimals.

ULTRASCREEN

Does the 49-character Tandy 100/102 display cramp your style?

by Donald Maxwell

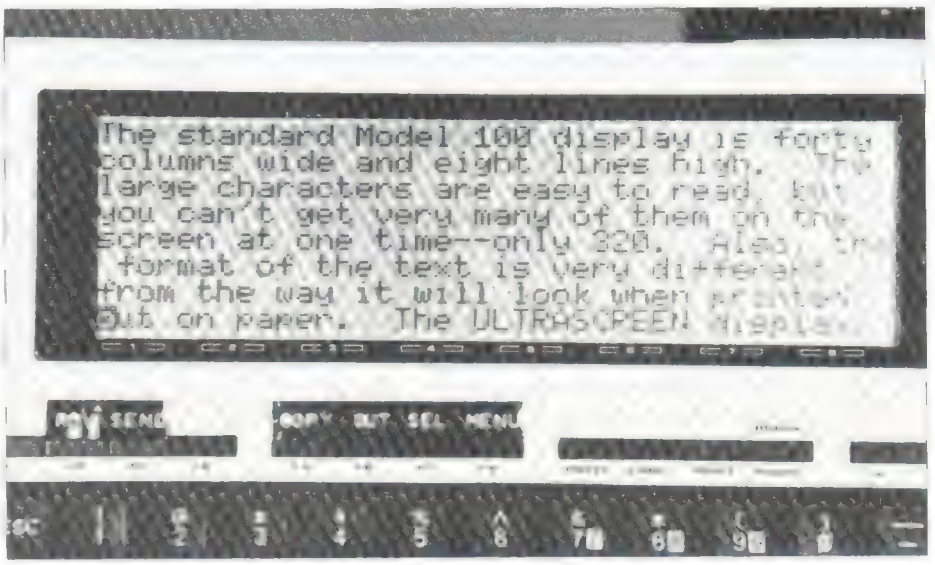
One of the best features of the Model 100 is its small size. One of the worst is its small screen. You just can't get many words onto eight 40-column lines.

But now there's a nifty new program called "ULTRASCREEN" that just about doubles the number of characters on the Model 100 or 102 screen. This improved display has ten lines of 60 columns each. That's 600 characters per screen—nearly equal to the 640 character display of the Model 200. Furthermore, you can switch back and forth at will between the ULTRASCREEN display and the standard one.

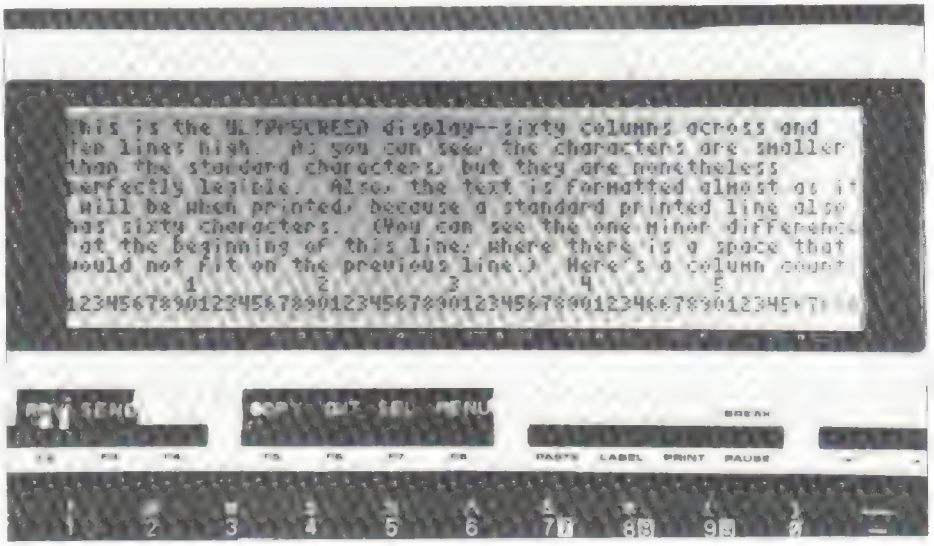
Does it really work? Yes! It works with all of the built-in utilities, and, because the program is relocatable, with just about every other program ever written for the Model 100/102. Furthermore, the ULTRASCREEN characters are just as easy to read as the standard ones.

It's all done with a 2,654 byte machine-language program with no hardware needed at all. Switching between the two displays couldn't be much easier. You just type "SCREEN 0" or "SCREEN 1" in BASIC. You can also change displays within a program if you like.

With the ULTRASCREEN installed, the main menu comes up as usual, with the standard-size characters and four columns of filenames. There is a subtle change though, the names of the five built-in application's programs now appear



Photograph 1. The Model 100/102 display normally has only eight lines of 40 characters capacity.



Photograph 2. ULTRASCREEN increases the display capacity to eight lines of 60 characters each.

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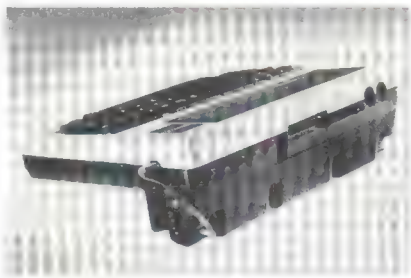

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in lower-case letters instead of upper case. For example, it will read "Text" instead of "TEXT." The names of files that you have SAVEd are still in upper-case, making them somewhat easier to tell from the built-in ROM programs.

As soon as you select an application, however, the ULTRASCREEN difference becomes obvious.

The ULTRASCREEN characters are noticeably smaller than the standard characters. Each ULTRASCREEN character occupies a matrix five pixels high and three wide. (The standard matrix is 7 x 5.) That's about as small as is possible, given the size of the pixels on the Model 100/102 screen. But small as they are, the ULTRASCREEN characters are clearly legible. In fact, they usually seem even *easier* to read than the standard characters, probably because they're more compact.

If you don't like the shape of a character, you can change it with a font editor that comes with ULTRASCREEN. I've tried it, but I'm generally pleased with the ULTRASCREEN character set. The numeral "8" is the only character that seems to suffer from the small size. It looks like two dotty diamonds, one above the other, but I couldn't improve on it. Anyway, I always know it's an "8."

When you're writing something, the more words you can see the better. So it's in TEXT that you'll really appreciate ULTRASCREEN. You'll be able to see approximately twice as many words as in the standard display. (True, there are 40 fewer character positions available than in two standard screens, but because the number of word-wraps is reduced by about one-third, you usually end up with more words on the screen.)

Also, 60 characters is the normal line length for pica type, so in effect, what you see on the 60-column screen is formatted pretty much the way it'll be when printed out on paper. Of course, if you specify a different line length or embed non-printing control characters in the text, the printed format will be different from what you see on the screen.

There is one drawback to using ULTRASCREEN in TEXT (but not in the other application programs). It accepts characters only about half as fast as the standard display does. For example, in the standard display, I entered 120 characters (three 40-column lines of solid text) in eleven seconds, but in ULTRASCREEN, it took 22 seconds to enter the same 120 characters (two 60-column lines). That's only about 45 words per minute—just about fast enough for a mediocre typist like me, but hardly satisfactory for fast copy typing. Fortunately, ULTRASCREEN seems to have a huge input buffer. At any rate, I've never been able to get so far ahead that it loses anything I've typed in. When I take a break, it just plugs along until it catches up.

TEXT makes you really appreciate ULTRASCREEN.

ULTRASCREEN is *especially* slow when inserting text into the middle of a paragraph. It is so slow, in fact, that I usually enter any long insert on a blank line and then CUT and PASTE it to where I want it.

This lack of speed in TEXT is not the best feature of ULTRASCREEN, but for me, at least, it's a small price to pay for twice the screen capacity.

Of course, you can always switch to the standard display if you need to do a lot of fast typing. I usually prefer to use a short type-in BASIC program that is in the ULTRASCREEN manual. It enables speed demons to enter text on the 600-character screen at any humanly-possible typing speed. You can't edit in this program, except for deleting to the left, but you can easily edit later in TEXT.

BASIC works the same with ULTRASCREEN as with the standard display with three exceptions. One is that program listings are a lot easier to read, with more lines visible and fewer wrapped-around lines. A second exception is that the "PRINT @" command will format things differently than in the standard display, because it works by counting character-locations from the "home" position. And the other exception is that printing to the screen actually goes slightly *faster* in ULTRASCREEN than in the standard display.

ULTRASCREEN easily keeps up with TELCOM, and in general the 600-character display is preferable to the standard one. Under certain circumstances, however, you may actually see fewer characters with ULTRASCREEN than with the standard display. This is because in the standard display, TELCOM lets you see the previous eight lines of text when you press F1. So in effect, you can look at 16 lines of 40-column text—640 characters. But this double-screen feature doesn't work with the ULTRASCREEN display, so you're limited to the one 600-character screen.

Ordinarily, this is fine. It's equivalent to seeing the two standard TELCOM screens at the same time. But if the computer you're communicating with sends a RETURN every 80 columns, then five of its lines will take up ten ULTRASCREEN lines, because every-other ULTRASCREEN line will have 40 blank spaces after the RETURN is received. In that case, the ULTRASCREEN display will hold no more than 400 received characters at a time. That's more than a single standard screen, but quite a bit less than the standard TELCOM double screen. Of course, you can always switch to the standard display, but to do so, you have to log off, go to BASIC, make the switch, and then log on again. (Or you may be able to tell the other computer to send you 60-character lines.)

There are a few other programs

that increase the number of characters on the Model 100/102 screen, but none of them has even come close to the improvements made by ULTRASCREEN. Despite the somewhat slow entry speed in TEXT, no other utility for the Model 100/102 has been as useful to me as ULTRASCREEN. I'd recommend it without hesitation to any Model 100/102 owner. ⌟

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Change Type Faces With A TRP-100?

Tired of the same old characters all the time? Try these tricks!

by Richard J. Dickson

Change type faces with a Model 100/102 and a TRP-100 printer? You've got to be kidding! But why not? Or at least so I asked myself.

Following several years in the commercial printing and typesetting business, I guess I have just been spoiled by sophisticated phototypesetting equipment. Need a new type face? Want to change the size of the face you're using? Why then, just push a button.

Most of the work we did was book and magazine work, so we didn't always get the full capability out of our equipment. We used it very much like an expensive word processor. But every once in a while the need arose to compose a ruled form, or even a display ad that could go to camera without any further paste-up.

And so in later years, as I play with the portable equipment on my lap (and even while sitting in the cockpit of my anchored sailboat), the thought occurs to me, "Wouldn't it be nice to be able to create a variety of type faces with the TRP? At least until they come out with a portable daisy-wheel model that I can use out here in the bay."

Well, good news! It is possible to create a variety of type styles, albeit a limited variety, with the TRP-100. Simply by entering a series of commands from the Model 100, documents can be created in BASIC that will simply amaze and further challenge your creative juices

```
SAMPLE HEADING


I just created a new type face
using nothing but my Model 100
and my unlimited imagination. WOW!
```

Figure 1. This type is the standard height, but twice the width.

```
SAMPLE HEADING
I just created a new type face
using nothing but my Model 100
and my unlimited imagination. WOW!
```

Figure 2. And it's easy to delete the extra spce.

ELONGATE

For instance, wouldn't it be nice to create some fancy headings in a larger size type for your reports and documents? If so, try *ELONGATE*, a type face that actually is the same height as normal TRP letters, but twice the width. The added size creates the illusion that you actually have a much larger type face.

Put your Model 100/102 in Command Mode (BASIC) and enter the following program:

```
10 LPRINT CHR$(27); CHR$(14)
20 LPRINT "SAMPLE HEADING"
30 LPRINT CHR$(27); CHR$(15)
40 LPRINT
50 LPRINT "I just created a new type
   face"
60 LPRINT "using nothing but my
   Model 100"
70 LPRINT "and my unlimited
   imagination. WOW"
80 END
```

Now, turn your printer on, align the paper, and if you're brave, type RUN and press ENTER (or simply press [F4]). Check out figure 1 for a sample.

SAMPLE HEADING

I just created a new type face using nothing but my Model 100 and my unlimited imagination. WOW!

If you think there's too much space between the heading and the body of your text, simply delete line 40 in the program. Placing a semicolon (;) at the end of line 30 will eliminate the space entirely (see figure 2).

Another use for ELONGATE that has been helpful, is printing an entire text in this expanded version. Public speakers find it most useful at the lectern. And even though we didn't try it in our sample, it works with both upper and lower case letters. For example, try changing line 20 to: *20 LPRINT "Sample Heading"* and see what happens.

One word of caution: if you're going to print an entire document in ELONGATE using the built in PRINT program on your Model 100, be sure to set the line length at 40 when prompted by the screen. Remember, you've doubled the width of each character, which means 40 ELONGATE characters take up the space of 80 regular characters.

SHRINKING YOUR DOCUMENT

But what about going the other direction? How about reducing the type size for footnotes? Or, suppose I want to miniaturize a document?

Simple! Use either *SUPERSCRIPT* or *SUBSCRIPT*. Try this program:

```
10 LPRINT "I've been having so
   much fun with my"
20 LPRINT "new TRP-100 that I
   don't have room"
30 LPRINT "to store all the docu-
   ments I've been"
40 LPRINT "creating. I wonder..."
50 LPRINT CHR$(27); CHR$(83);
   CHR$(01)
60 LPRINT "Wouldn't it be nice if"
70 LPRINT "I could shrink all this:
80 LPRINT "paperwork down to a
   more"
90 LPRINT "reasonable size?"
95 LPRINT CHR$(27); CHR$(88)
97 END
```

Again, type RUN, press ENTER, and check out the results (figure 3A).

Now then, there still seems to be a bit too much space between the lines, so let's add: *55 LPRINT C H R $ (2 7) ; CHR$(28)* and *96 LPRINT CHR$; CHR$(54).*

Got it in your program? Then run it again (see figure 3B).

Aha! We did it! BIG LETTERS to small letters. And all with our Model 100 and a TRP-100. Keep in mind that while SUBSCRIPT and SUPERSCRIPT may look alike in print, SUB-occupies the lower half of the line space and SUPER-occupies the upper half. The difference is in the entry code.

Figure 3A. Use Superscript to miniturize your text.

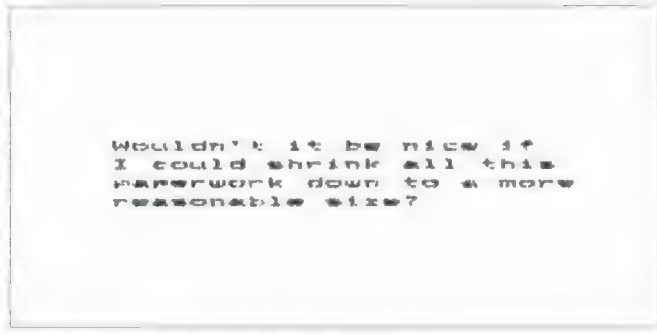

Figure 3B. Then reduce the space between lines.

```
SUBSCRIPT=CHR$(01)
SUPERSCRIPT=CHR$(00)
```

HIDDEN SURPRISES

BUT-Don't turn the page yet. We're not through.

"We're not? But I've been looking through my TRP-100 Operation Manual, and I see all these faces you've created, but I don't see any more? What have you got in mind?"

Unsatisfied creature that I am, I just had to ask, "What if...?" You'll never guess what I came up with. I call it SUBELONGATE (also SUPER-ELONGATE). I suspect you see what's coming already.

Try this:

```
10 LPRINT CHR$(27); CHR$(14);
   CHR$(27); CHR$(83); CHR$(01)
20 LPRINT "Hello, My name is (Your
   Name)"
30 LPRINT CHR$(27); CHR$(15);
   CHR$(27); CHR$(88)
40 END
```

Do you think you know what's coming? As before, type RUN and press ENTER (see figure 4).

Well, there you have it. Another type face that will make equally nice headings for your reports or documents. Actually, if you use SUPER-ELONGATE (CHR$(00) and add the UNDERLINE commands, you have a very nice looking heading: *LPRINT; CHR$(15); "HEADING"; CHR$(14).*

A few words in closing. You probably noticed as you ran your sample programs that the SUB- and SUPER- formats cause the print head to move twice over the paper for each line. That's the way it's supposed to work so don't worry that

Figure 4. Sub-elongate or super-elongate type faces are also possible

```
Page 1

1 CLS: PRINT TAB(15) "<<< FONTS >>>"
2 PRINT: PRINT "   This program will produce a type face
speciman sheet with instructions for    entering printer
commands."
3 PRINT "   If you are ready to begin, BE SURE    PRINTER
IS ON AND PAPER ALIGNED, then   press SPACE BAR to
continue.";
4 Y$=INKEY$: IF Y$ = "" THEN 4 ELSE 5
5 LPRINT TAB(30) "<<< FONTS >>>"
6 LPRINT
10 LPRINT TAB (10) "     The following type faces are
available for use on the"
11 LPRINT: LPRINT TAB(30) "TRS-80 TRP 100"
12 LPRINT TAB(26) "Thermal Ribbon Printer": LPRINT
13 LPRINT TAB(10) "They are entered according to the codes
shown, each beginning"
14 LPRINT TAB(10) "with the LPRINT command."
15 LPRINT
20 LPRINT TAB(10); CHR$(15); "DOT MATRIX"; CHR$(14)
25 LPRINT
30 LPRINT TAB(10) "     No special code needs to be entered
to use this normal"
31 LPRINT TAB(10) "computer type face. The easiest way to
return to this face"
33 LPRINT TAB(10) "after using other styles, is to turn the
printer OFF and back"
34 LPRINT TAB(10) "ON again."
35 LPRINT
40 LPRINT TAB(10); CHR$(15); "ELONGATE"; CHR$(14)
45 LPRINT
50 LPRINT TAB(10) "Enter: LPRINT CHR$(27); CHR$(14)"
60 LPRINT TAB(10) "Clear: LPRINT CHR$(27); CHR$(15)"
65 LPRINT
70 LPRINT TAB(10): LPRINT CHR$(27); CHR$(14) "ELONGATE type
face uses the"
71 LPRINT TAB(5) "same line height but doubles"
72 LPRINT TAB(5) "the width of each letter. When"
73 LPRINT TAB(5) "using with the PRINT program,"
74 LPRINT TAB(5) "be sure to change line length"
75 LPRINT TAB(5) "to 40.": LPRINT CHR$(27); CHR$(15)
76 LPRINT
80 LPRINT TAB(10); CHR$(15); "SUPERSCRIPT"; CHR$(14)
85 LPRINT
90 LPRINT TAB(10) "Enter: LPRINT CHR$(27); CHR$(83);
CHR$(00)"
100 LPRINT TAB(10) "Clear: LPRINT CHR$(27); CHR$(88)"
105 LPRINT
110 LPRINT TAB(20): LPRINT CHR$(27); CHR$(83); CHR$(00)
"SUPERSCRIPT takes the same character"
111 LPRINT TAB(20) "width but only half the height. Used"
112 LPRINT TAB(20) "with the Half Forward Line Feed code"
```

continued

Listing 1. This program, FONTS.BA, produces a specimen type face sheet with instructions for entering the code needed to use each type face.

```
113 LPRINT TAB(20) "(see below) it is an excellent way to"
114 LPRINT TAB(20) "miniaturize documents.": LPRINT
CHR$(27); CHR$(88)
115 LPRINT
120 LPRINT TAB(10); CHR$(15); "SUBSCRIPT"; CHR$(14)
125 LPRINT
130 LPRINT TAB(10) "Enter: LPRINT CHR$(27); CHR$(83);
CHR$(01)"
140 LPRINT TAB(10) "Clear: LPRINT CHR$(27); CHR$(88)"
145 LPRINT
150 LPRINT TAB(20); LPRINT CHR$(27); CHR$(83); CHR$(01)
"SUBSCRIPT is the same as SUPERSCRIPT"
151 LPRINT TAB(20) "but positioned on the lower half of
the"152 LPRINT TAB(20) "line. In document use the two
appear to"
153 LPRINT TAB(20) "be the same.": LPRINT CHR$(27);
CHR$(88)155 LPRINT
160 LPRINT TAB(10); CHR$(15); "SUPERELONGATE"; CHR$(14); "
(SUBELONGATE)"
165 LPRINT
170 LPRINT TAB(10) "Enter: LPRINT CHR$(27); CHR$(14);
CHR$(27); CHR$(83); CHR$(00)"
180 LPRINT TAB(10) "Clear: LPRINT CHR$(27); CHR$(15);
CHR$(27); CHR$(88)"
185 LPRINT TAB(17) "OR, turn the printer OFF"
190 LPRINT
195 LPRINT TAB(10): LPRINT CHR$(27); CHR$(14); CHR$(27);
CHR$(83); CHR$(00) "This type face combines the two"
196 LPRINT TAB(5) "other options for an interesting"
197 LPRINT TAB(5) "type face of many uses.": LPRINT
CHR$(27); CHR$(15); CHR$(27); CHR$(88)
200 LPRINT
205 LPRINT TAB(10) "HALF FORWARD LINE FEED"
210 LPRINT
215 LPRINT TAB(10) "Enter: LPRINT CHR$(27); CHR$(28)"
220 LPRINT TAB(10) "Clear: LPRINT CHR$(27); CHR$(54)"
221 LPRINT TAB(17) "(Full Forward Line Feed)"
225 LPRINT TAB(17) "OR, turn the printer OFF"
230 LPRINT
235 END
```

End of listing.

you've done something to your machine.

Also, I find it helpful to have a display sheet for each of these faces, along with the instructions for creating them. In order to make it more convenient for you to use these type faces, then I suggest that you set up the program included with this article (listing 1) and run it off. Use a piece of good bond paper and a thermal ribbon cartridge since you'll want to save it. (I've found that the thermal paper that comes in the rolls tends to fade after a time.)

So now, enjoy your printer. And by all means don't think you're limited in what you can do because it's portable. I carry mine aboard the boat in the summer and use it for navigation printouts and weather forecasts, as well as to type letters to mail back home.

But above all, BE CREATIVE! Experiment! And be sure to keep trying new things. You might surprise even yourself.

❑

Using The Model 100 Bar Code Reader As A Tachometer/Counter

This article presents an unusual use for a bar code reader and a Model 100

by Frank W. Schrader

Besides being a computer buff, I am also a machine shop nut. Not having a tachometer to check spindle speeds on machine tools in my shop, but being in possession of a Model 100 and a Radio Shack Bar Code Reader (which I confess has not been used much, except to read UPC codes on my groceries), I devised a program and, thereby, probably created the world's most expensive tachometer.

If you don't happen to have a shop full of machine tools, but do have a record turntable with a variety of speeds, you can check the turntable Revolutions Per Minute (or check the calibration of the programs, as the case may be). A sheet of white paper, with a black line, approximately 1/32 of an inch wide, drawn across the center and taped to the turntable will serve as the visual reference for the wand.

Drawing the line all the way across the paper gives two counts per revolution for use of the programs as presented. This can be changed by

```
5 REM Poke program for generating TACH.CO  By: F.W.Schrader  11/87
10 FOR I= 52224 TO 52259
20 READ N
30 POKE I,N
40 NEXT I
50 SAVEM"TACH.CO",52224,52259
1000 DATA  33, 64, 204, 30, 0, 205, 131, 114, 194, 35, 204, 219, 187, 230, 8,
202, 21, 204, 195, 5, 204, 28, 123, 254, 11, 202, 35, 204, 119, 62, 7, 231, 195,
5, 204, 201
```

Listing 1. A simple BASIC program which pokes the code for TACH.CO into memory

```
0 CLS 'TACH.BA By F.W.Schrader 11/87
1 IF 8 AND INP(167) THEN 1:GOTO 1 ELSE 10
10 TIME$="00:00:00" ' SET CLOCK TO ZERO AFTER FIRST BAR DETECTED
30 CALL 16959       ' INHIBIT SCROLLING
50 CLEAR 256,52224
60 LOADM"TACH.CO"   ' GO FIND THE TIME FOR 10 TRANSITIONS.
70 CALL 52224       ' IN SECONDS.
80 T$=MID$(TIME$,7,2)
90 T=VAL(T$)
95 R=300/T          ' CALCULATE RPM
100 CALL 16964      ' SCROLL AGAIN
110 PRINT@ 170,INT(R):PRINT@174," RPM"
120 GOTO 1          ' SAMPLE TIME AGAIN.
500 CLOSE
```

Listing 2. The BASIC counting program that will tell you the RPM..

```
Source code for TACH.CO

        ORG     0CC00H
        LXI     H,0CC40H
        MVI     E,0       'Set count to 0
WAND:   CALL    7283H     'Check if BRK pressed
        JNZ     DONE      'Quit
        IN      0BBH      'INPUT FROM WAND
        ANI     8
        JZ      BEEP      'BEEP IF BAR
        JMP     WAND
BEEP:   INR     E         'INCR COUNT
        MOV     A,E
        CPI     0BH       'IS COUNT 10+1?
        JZ      DONE      'BACK TO BASIC
        MOV     M,A       'AND CALC RPM
        MVI     A,7       'GENERATE BEEP
        RST     4
        JMP     WAND      'SAMPLE AGAIN TILL 11 BAR COUNTS
DONE:
        RET
        END
```

Listing 3. The assembly source code that produces TACH.CO

changing the arithmetic in the basic program and drawing more radial lines on the paper.

It is a good idea to tape a piece of clear or translucent plastic over the paper to save wear and tear on the paper or the end of the wand.

After loading the programs, and with the turntable turning, hold the wand tip gently against the plastic at approximately a 20 degree angle to the vertical, and run the BASIC program by pressing the F4 key. The computer will beep each time the bar passes under the wand. After ten transitions, the computer returns to BASIC, does the arithmetic, prints the Revs Per Minute and returns to the machine language program for another sample. Don't forget to press the read button on the wand. If the wand is held away from the paper on the turntable and the read button is pressed, you should get a constant count of 300 RPM the way the programs are set up.

To break out of the program and return to BASIC, press CTRL C. Don't forget to reset the computers clock after fooling around with these programs or you are liable to be late for work in the morning.

At higher RPM's it may be necessary to draw black, radial wedges on the paper to permit the wand to see them. Do not make the angle too obtuse or you will get more than one count per passing. The math is left to the reader. As already confessed, the writer is a computer buff and a machine shop nut, not a math whiz. ❑


```
Object code generated by BASIC poke program or assembly of TACH.DO

CC00                    ORG     0CC00H
CC00 21 CC40            LXI     H,0CC40H
CC03 1E 00              MVI     E,0       'Set count to 0
CC05 CD 7283    WAND:   CALL    7283H     'Check if BRK pressed
CC08 C2 CC23            JNZ     DONE      'Quit
CC0B DB BB              IN      0BBH      'INPUT FROM WAND
CC0D E6 08              ANI     8
CC0F CA CC15            JZ      BEEP      'BEEP IF BAR
CC12 C3 CC05            JMP     WAND
CC15 1C         BEEP:   INR     E         'INCR COUNT
CC16 7B                 MOV     A,E
CC17 FE 0B              CPI     0BH       'IS COUNT 10+1?
CC19 CA CC23            JZ      DONE      'BACK TO BASIC
CC1C 77                 MOV     M,A       'AND CALC RPM
CC1D 3E 07              MVI     A,7       'GENERATE BEEP
CC1F E7                 RST     4
CC20 C3 CC05            JMP     WAND      'SAMPLE AGAIN TILL 11 BAR COUNTS
CC23            DONE:
CC23 C9                 RET
        0000            END

00000 Errors
```

Listing 4. The object code produced by the assembly code in listing 3.

Crazy Boxes II

A Model 100 Box Game Update on Request

by Emmett J. Carmody

Soon after my *Crazy Like a Box* game was published in the September 1987 issue of *Portable 100*, a reader wrote me to say that he liked the game but that he would like to see some changes made. In particular, he requested that the number of boxes be made variable, and also that the penalty for errors in play be **loss of a box** instead of **loss of a turn**. With the first version it seems that a sneaky player can fake an error when there are no "safe" moves, thus putting his opponent on the spot instead of himself. Of course, this would be dishonest, and we know that Tandy computer users would never do it. However, the suggested modifications seemed worth while—so herewith, for those who are interested, is the updated version.

The listing is a complete listing, requiring slightly more than 3K of memory. The discussion will concentrate on the changes only, which include some additional streamlining. Where practical, the same line numbering has been retained. My count shows that 11 of the original lines have been dropped, 21 new lines have been added and 43 lines have been changed in some way.

Summarizing, it is a two-player game. The board consists of a rectangle of dots. Players take turns connecting dots to form squares. Boxes belong to the player complet-

```
PROGRAM LISTING

1  'BOXNEW.BA  10/16/87  E. Carmody
5  CALL 16959:CLEAR1000
10 DEFINTA-Z:DIMS(2):P=1
20 CLS:CALL17001:PRINT@0,"cRaZy LikE a BOX";:CALL17006
30 PRINT:PRINT"SELECT NUMBER OF COLUMNS, 5 TO 13":INPUT"HOW MANY";CL
:IFCL<5ORCL>13THENBEEP:GOTO30 ELSE DIM A(CL*5,5):TL=(CL+1)*5+CL*6
40 PRINT@80,"Two players take turns.       ";CHR$(227);" 1 ";CHR$(228)
50 PRINT@120,"Connect dot-pairs to draw          ";CHR$(234)
60 PRINT@160,"sides and close boxes.       4     ";CHR$(234);" 2"
70 PRINT@200,"Select boxes & sides by        ";CHR$(225);" 3 ";CHR$(226)
80 PRINT@240,"coordinates - e.g. a32 is...BOX a3"
90 PRINT@280,"Close box & keep turn.       SIDE 2"
95 FORI=1TO10000:NEXTI
100 CLS:CALL17001:PRINT@0,"cRaZy LikE a BOX";:CALL17006
:B$="abcdefghijklm":PRINT@25,LEFT$(B$,CL)
110 FOR X=1 TO 5:PRINT@22+(X+1)*40,X:NEXT
120 FOR Y=15 TO 55 STEP 8:FOR X=149 TO CL*6+149 STEP 6
130 PSET(X,Y):PSET(X+1,Y):PSET(X,Y+1):PSET(X+1,Y+1)
140 NEXTX:NEXTY
210 S=0:F1=0:F2=0:PRINT@80,"PLAYER";P;:BEEP:INPUT"BOX & SIDE";B$
220 C1=ASC(LEFT$(B$,1)):C2=VAL(MID$(B$,2,1))
230 S=VAL(RIGHT$(B$,1)):FORI=1TO300:NEXT
235 FORI=4TO6:PRINT@I*40,SPACE$(20):NEXT
240 IFC1<97 OR C1>97+CL-1 OR C2<1 OR C2>5 OR S<1 OR S>4 THEN 10000
250 N=(C1-72)+(C2+1)*40    'CURSOR POS
260 N1=C1-96+(C2-1)*CL     'BOX#
270 IFA(N1,S)=1 THEN 10000
280 X=(NMOD40)*6
290 Y=8*INT(N/40)
300 ONS GOTO 1000,2000,3000,4000
1000 LINE(X,Y-1)-(X+5,Y-1):LINE(X,Y)-(X+5,Y):P$=RIGHT$(STR$(P),1)
1010 A(N1,1)=1:A(N1,5)=A(N1,5)+1:K=K+1
1020 IFC2=1THEN1040
1030 A(N1-CL,3)=1:A(N1-CL,5)=A(N1-CL,5)+1
1040 GOSUB6000
1045 IFC2=1THEN1060
1050 IFA(N1-CL,5)=4ANDP=2THENA(N1-CL,5)=5
1052 IFA(N1-CL,5)=4ORA(N1-CL,5)=5THEN BEEP:PRINT@N-40,P$:S(P)=S(P)+1:F2=1
1060 IFF1=1 OR F2=1 THEN GOSUB8000:GOTO4230
1070 GOTO7000
2000 LINE(X+5,Y)-(X+5,Y+7):LINE(X+6,Y)-(X+6,Y+7):P$=RIGHT$(STR$(P),1)
2010 A(N1,2)=1:A(N1,5)=A(N1,5)+1:K=K+1
2020 IFC1=97+CL-1THEN2040
2030 A(N1+1,4)=1:A(N1+1,5)=A(N1+1,5)+1
2040 GOSUB6000
2045 IFC1=97+CL-1THEN2060
2050 IFA(N1+1,5)=4ANDP=2THENA(N1+1,5)=5
2052 IFA(N1+1,5)=4ORA(N1+1,5)=5THEN BEEP:PRINT@N+1,P$:S(P)=S(P)+1:F2=1
2060 IFF1=1 OR F2=1 THEN GOSUB8000:GOTO4230
2070 GOTO7000
3000 LINE(X,Y+7)-(X+5,Y+7):LINE(X,Y+8)-(X+5,Y+8):P$=RIGHT$(STR$(P),1)
3010 A(N1,3)=1:A(N1,5)=A(N1,5)+1:K=K+1
3020 IFC2=5THEN3040
3030 A(N1+CL,1)=1:A(N1+CL,5)=A(N1+CL,5)+1
3040 GOSUB6000
3045 IFC2=5THEN3060                                          continued
```

Listing 1. The new, improved version of last September's Crazy Boxes *game.*

ing the box. The player with most boxes after all have been closed wins. Input errors early in the game result in loss of turn. Late in the game to discourage cheating (by strangers, of course), an input error will not result in loss of a turn but loss of a box instead—if you have one or more, that is. Typical errors are: wrong coordinates for boxes or sides, use of upper case for the column coordinate instead of lower case,or drawing a line that has already been drawn. The computer does all the work—drawing the lines, keeping the score, keeping track of whose turn it is and levying the penalties. All you have to do is sit back and have fun.

Line 30 contains an input prompt, requesting the number of columns desired; the limits are 5 to 13, which

The computer does all the work

permit playing boards to consist of 25 to 65 boxes in increments of 5. The variable assigned is CL and from it, the variable TL (for total lines) is calculated. Use of CL led to necessary changes in Lines 100 and 120, where the playing board is constructed. CL is also needed in several places to define locations within the array A(,) which tracks box status.

Lines 80, 210, 220 and 230 have been changed to eliminate the comma required previously in identifying box and side. This speeds up input time.

Line 235 was added to delete error messages which could occur from some incorrect input sequences.

A different formula is used in Line 260 to find the box number in the array of boxes. The constant 96 converts the ASCII value of "a" (97) to "1' (for box 1) and the rest of the formula

```
3050 IFA(N1+CL,5)=4ANDP=2THENA(N1+CL,5)=5
3052 IFA(N1+CL,5)=4ORA(N1+CL,5)=5THENBEEP:PRINT@N+40,P$:S(P)=S(P)+1:F2=1
3060 IFF1=1 OR F2=1 THEN GOSUB8000:GOTO4230
3070 GOTO7000
4000 LINE(X-1,Y)-(X-1,Y+7):LINE(X,Y)-(X,Y+7):P$=RIGHT$(STR$(P),1)
4010 A(N1,4)=1:A(N1,5)=A(N1,5)+1:K=K+1
4020 IFC1=97THEN4040
4030 A(N1-1,2)=1:A(N1-1,5)=A(N1-1,5)+1
4040 GOSUB6000
4045 IFC1=97THEN4060
4050 IFA(N1-1,5)=4ANDP=2THENA(N1-1,5)=5
4052 IFA(N1-1,5)=4ORA(N1-1,5)=5THENBEEP:PRINT@N-1,P$:S(P)=S(P)+1:F2=1
4060 IFF1=1 OR F2=1 THEN GOSUB8000:GOTO4230
4070 GOTO7000
4230 GOSUB5000:FORI=1TO10:BEEP:BEEP:PRINT@240,"      ";:FORJ=1TO50:NEXT
:PRINT@240,"FINAL";:NEXT
4240 GOTO4240
5000 PRINT@280,"SCORE: #1:";S(1);" #2:";S(2);
5010 RETURN
6000 IFA(N1,5)=4ANDP=2THENA(N1,5)=5
6010 IFA(N1,5)=4ORA(N1,5)=5THEN BEEP:PRINT@N,P$:S(P)=S(P)+1:F1=1
6020 RETURN
7000 IFP=1THENP=2:PRINT@120,SPACE$(20):GOTO210
7010 IFP=2THENP=1:PRINT@120,SPACE$(20):GOTO210
8000 FORI=1TOCL*5:IFA(I,5)<>4ANDA(I,5)<>5 THENPRINT@120,SPACE$(20)
:GOSUB5000:GOTO210
8010 NEXTI:RETURN
10000 BEEP:PRINT@120,"INPUT ERROR          ":BEEP:BEEP:FORI=1TO500:NEXT
:BEEP
10010 IFK=>TL/2.3THEN10040ELSE10020
10020 IFP=1THENP=2:GOTO210
10030 IFP=2THENP=1:GOTO210
10040 FORI=1TOCL*5
10050 IFA(I,5)=4ANDP=1THENGOSUB10090:A(I,5)=5:PX=2:S(1)=S(1)-1
:S(2)=S(2)+1:GOTO10080
10060 IFA(I,5)=5ANDP=2THENGOSUB10090:A(I,5)=4:PX=1:S(1)=S(1)+1
:S(2)=S(2)-1:GOTO10080
10070 NEXTI:GOTO210
10080 GOSUB5000:P$=RIGHT$(STR$(PX),1):PRINT@M,P$:GOTO210
10090 ROW=INT((I-1)/CL):COL=(I-1)MODCL:M=105+COL+ROW*40:RETURN
```

End of listing

increases this to the correct box number.

A variable K is incremented each time a line is drawn in Lines 1010, 2010, 3010 and 4010 to keep track of the total number of lines drawn. K is then used in Line 10010 to determine whether or not to reverse player turn when errors are made. The constant 2.3 was determined experimentally to divide game time into two periods: while K < TL/ 2.3 it should still be possible to find "safe" places to draw a line on the board and a playing error will result in loss of turn, not loss of box. TL is the maximum number of lines which can be drawn for a given board size.

To reduce program size, three subroutines are called in the four drawing sections for the four different sides of each box, 1000-1070, 2000-2070, 3000-3070 and 4000-4070. These are the routines at 6000, 7000, and 8000. In 6000-6020 box ownership is reversed but not player turn. In 7000-7010 only player turn is reversed. Routine 8000-8010 checks for still-open (i.e. not closed boxes). On finding the first such box, it calls 5000 to print the score and then returns to Line 210 for input. As a result of use of the subroutines, these lines in the original version have been eliminated: 1080-1230, 2080-2230, 3080-3230 and 4080-4220.

Note in Line 1050, 2050, 3050 and 4050 that when player #2 closes a box a "5" instead of a "4" is placed in column 5 of array A(,) so that box ownership can be tracked. This necessitated new lines 1052, 2052, 3052 and 4052.

The routine in Lines 10040-10090 accomplishes the loss-of-box penalty for errors in the last half of the game. Subroutine 10090 translates from box number to screen cursor position so the correct player number can be printed in the proper location, "M". Line 10080 does the printing. ❑

Build a Better Mousetrap

by Alan L. Zeichick

Last month we discovered that even though there may be several solutions to every programming problem, only one of those solutions is the best. In that vein, let's examine a simple programming task that may not be as clever as it first appears.

We want to clear the Model 100's LCD and display the words "Portable 100" on the first line. The standard way of programming that operation is:

```
10 CLS
20 PRINT "Portable 100"
```

The Model 100-family BASIC uses special display codes called *escape sequences*, usually single letters preceded by ASCII 27. Examples include Esc-p (CHR$(27)+"p"), which turns on inverse video, and Esc-q, which resumes normal printing. Another escape sequence is Esc-E, which clears the liquid-crystal display. Can we use that escape code to create the statement PRINT CHR$(27);"EPortable 100"? We sure can, and it does the trick. Is it any faster? Let's use the Model 100's real-time clock to time a few thousand repetitions of the original version, placing the CLS and PRINT statements on one line to add a bit of efficiency:

```
100 TIME$="00:00:00"
110 '
120 FOR C=1 TO 5000
130 CLS:PRINT "Portable 100"
140 NEXT C
150 '
160 PRINT TIME$
```

After you're through running these timing programs, you'll need to reset your system clock to the correct time. In terms of memory, this program, when saved as the tokenized BASIC file CLS.BA, consumed 88 bytes, and as a text file, CLS.DO, used 115 bytes of RAM. It took 321 seconds to run.

To try the second choice, I change line 130 to the following:

```
130 PRINT CHR$(27);"EPortable 100"
```

This file needed 94 bytes saved as ESCAPE.BA, and 122 as ESCAPE.DO. This version ran in 325 seconds. Why is this oh-so-clever version slower and bigger? CLS is a BASIC keyword which occupies only a few bytes, and the BASIC interpreter knows exactly what to do when it sees it. The ASCII version, on the other hand, requires a call to the CHR$() function, and a decoding of the Esc-E function by the interpreter—all of which results in the same action as the shorter, more direct CLS.

The moral of the story is, check it out. An ingenious solution may be the next best thing to sliced bread. Or it might only be a burnt bagel.

MAKING IT RUN

A few days after each issue of *Portable 100* reaches the subscribers, I'm inundated with phone calls about programs—"I can't get it to run." Usually, the reader has misinterpreted the article's instructions or made a very subtle typo. At other times, the laptop computer's BASIC environment has been changed from the cold-start default, and the program needs to correct this. When 11:30 PM rolls around, and you *still* can't get the program to run, try these suggestions:

1. If the error message is **?OD**, *out of data*, count the number of items in your data statements, and check the positioning of quotation marks and commas.
2. If you are *out of memory*, **?OM**, you'll need to free up some RAM. Save some files to cassette or disk, and then KILL them from RAM.
3. If you see **?TN**, *type mismatch*, you've probably left a dollar sign off of a string variable's name.
4. The **?OS**, *out of string space* message occurs when the program requires more string variable storage space than you have defined in a CLEAR statement. If the program

contains a CLEAR function, increase the first parameter. If it doesn't have one, insert one after any DEF statements. Start with CLEAR 1000, and make it bigger if you have to.
5. If an OPEN statement results in **?BN** *bad file number*, the MAXFILES parameter is probably too low. Check the line with the bad file number for a biographical error. If it's okay, then add a line to your program, after the DEF statements, that says MAXFILES=3. (Three is the Model 100's default, and usually solves the problem.)

Other errors are often harder to find. Here are a few tricks which work for me:

1. If the error message is **?OD**, *out of data*, count the number of items in your data statements, and check the positioning of quotation marks and commas.
2. If you are *out of memory*, **?OM**, you'll need to free up some RAM. Save some files to cassette or disk, and then KILL them from RAM.
3. If you see **?TN**, *type mismatch*, you've probably left a dollar sign off of a string variable's name.
4. The **?OS**, *out of string space* message occurs when the program requires more string variable storage space than you have defined in a CLEAR statement. If the program contains a CLEAR function, increase the first parameter. If it doesn't have one. insert one after any DEF statements. Start with CLEAR 1000, and make it bigger if you have to.
5. If an OPEN statement results in **?BN** *bad file number*, the MAXFILES parameter is probably too low. Check the line with the bad file number for a biographical error. If it's okay, then add a line to your program, after the DEF statements, that says MAXFILES=3. (Three is the Model 100's default, and usually solves the problem.)

Finally, don't forget the obvious:

1. Are all required data files present in RAM or on disk, and do they have the correct names?
2. If the program requires the printer, is it properly connected, loaded with paper, and ready to print? You might wish to test the printer's connection by printing any small TEXT document.
3. If the program prints graphics or uses special printer functions, does your own printer support those features?

If the above steps don't help, then give *Portable 100* a call—but please, wait until morning.

Next month: More algorithm ideas! ❑

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Equally as incredible as the hardware is the built-in BOOSTER PAK software. Our unique virtual RAM disk software eliminates any need to do "bank switching." File subdirectories are supported for easy organization of your data. BASIC programs can access files as large as your RAM memory—up to two megabytes! We have also included our popular TS-DOS disk operating system for use with the Tandy disk drive and our new Desk-Link software, as well as an XMODEM program to upload/download files up to 2 megabytes directly to the virtual RAM disk. And to top it off, we have even included a fast action Asteroids game with amazing graphics in our standard BOOSTER PAK.

The BOOSTER PAK Everything You Asked For and More!

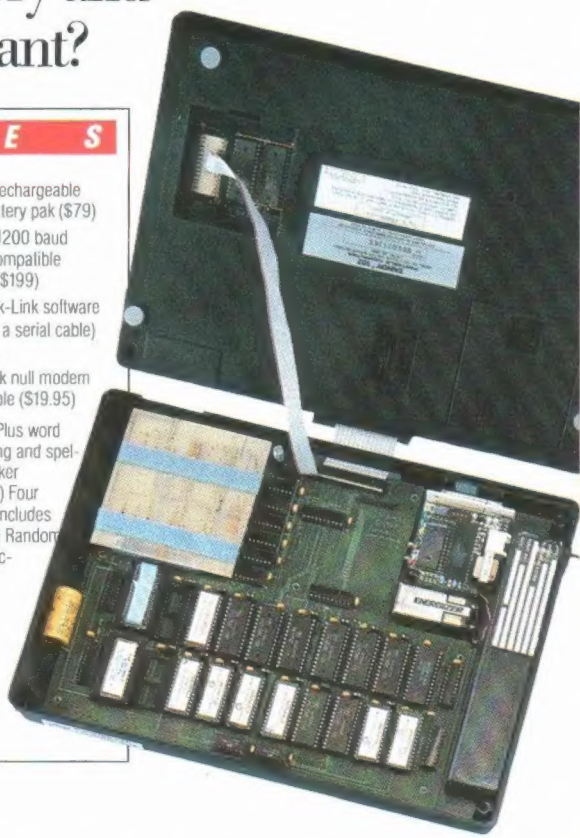
F E A T U R E S

Here's what you get in a standard BOOSTER PAK for only $429:

- 128K of RAM memory (96K available for files)
- 64K of ROM software
- 16 socketed slots for 32K RAM and/or ROM software chips
- 2 Tandy Molex ROM sockets
- Virtual RAM software (no bank switching or copying)
- File folders/sub-directories supported
- TS-DOS disk software built-in
- XMODEM file upload/downloading to virtual RAM
- Long-life lithium battery for RAM backup (rated at 7 years)
- BASIC programming access to virtual RAM
- ROM environment software (mix and match any ROM software)
- Ability to develop ROM software from 32-480K in size
- Fast action Asteroids game (with great graphics) built-in

BOOSTER PAK Options

- 32K RAM (certified low power) chips ($20 ea.)
- 6 slot RAM expansion board ($68)
- 256K RAM expansion modules (requires expansion board) ($159 ea.)
- Internal rechargeable nicad battery pak ($79)
- Internal 1200 baud Hayes-compatible modem ($199)
- IBM Desk-Link software (requires a serial cable) ($39.95)
- Desk-Link null modem serial cable ($19.95)
- Sardine Plus word processing and spelling checker ($199.95) Four chip set includes complete Random House dictionary



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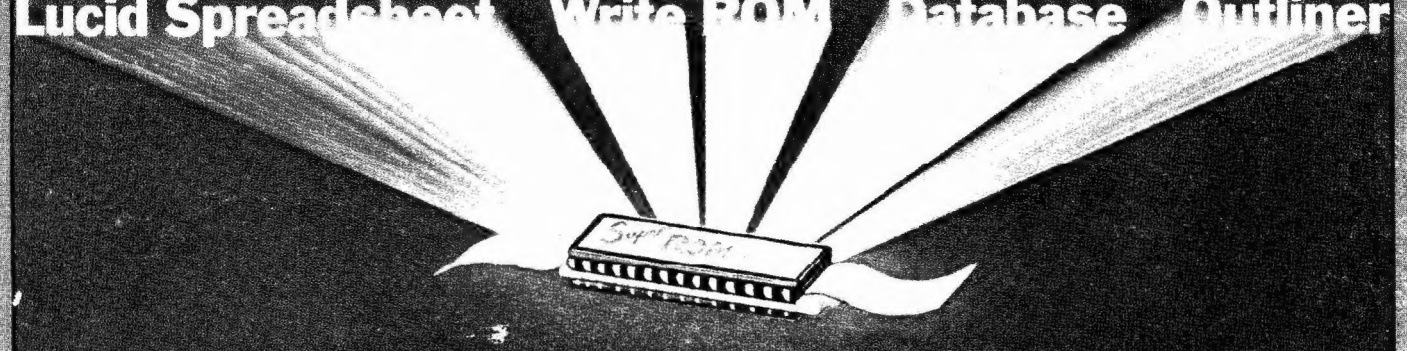

NOW YOU CAN REALLY HAVE IT ALL!

All on one ROM. Truly the finest four programs available for the Model 100 — guaranteed. Try it for 30 days. If you aren't blown away by the excellence return it for a full refund.

$199.95

The four best programs for the Model 100 all on one ROM. 32K of power without using any RAM for program storage. This is the PCSG Snap-In ROM that just presses easily into the little ROM socket in the compartment on the back. You access the four right from the main menu like built-ins.

Write ROM — the definitive word processor for the Model 100. Function key formatting or dot commands. Search and replace. Library feature — inserts words, phrases or whole documents into text from just a code. MAP lets you see a picture of your document. In all there are 60 features and functions. No one can claim faster operation. FORM lets you create interactive forms with on-screen prompts that you can answer from the keyboard. Nothing else for the Model 100 compares with the features of Write ROM. Exactly the same as the Write ROM sold as a single program. Infoworld says it "makes the Model 100 a viable writing unit ... surpassed our highest expectations for quality and clarity."

Lucid Spreadsheet: This is the one PICO magazine says "blows Multiplan right out of the socket" and Infoworld performance rated as "excellent" and said "makes the Model 100 compute." Gives you features you cannot get with Lotus 123. Lets you build spreadsheets in your Model 100 that would consume 140-150K on a desktop. Program generating capability with no programming knowledge required. Variable column widths. Includes find and sort with function key control. It's fast, recalculates like lightning. No feature has been taken from the original, only new ones added.

Database: This is a relational data base like no other. You can do everything from mailing lists to invoices. No complicated pseudo-coding, you create input screens as simply as typing into TEXT. You are not limited by size; you can have as large an input screen as you wish. Prints out reports or forms, getting information from as many files as you like. Complete math between fields. Total interface with Lucid worksheets.

Outliner: Does everything that Thinktank does on a PC but a whole lot better. Includes a Sort for your headlines. Lets you have headlines of up to 240 characters. Has cloning, hoisting and sideways scroll up to 250 characters. Like Lucid, this one sets a new standard for outliners. This is the way to plan and organize your projects.

Present Lucid and Write ROM owners can upgrade for $150. If you have both it's $125.

As usual PCSG sells the Super ROM on a thirty day guarantee. If for any reason you are not satisfied, simply return it for a full refund.

We are excited about this product. Super ROM gives the Model 100 the true power of a desktop. No other multi-program ROM has software that compares. But don't take our word for it. We invite you to make that comparison yourself. Priced at $199.95 on Snap-In ROM.

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